4D.3 BIOLOGICAL RESOURCES

4D.3.1 Terrestrial Vegetation and Wetlands

4D.3.1.1 Alternative D – CPAI Development Plan Impacts on Terrestrial Vegetation and Wetlands

Figures 4D.3.1-1 and 4D.3.1-2 show the vegetation and habitats affected and Tables 4D.3.1-1 and 4D.3.1-2 summarize the area of vegetation types and habitats affected under CPAI Development Plan Alternative D. All impacts under CPAI Development Plan Alternative D would be to wetlands. Differences in impacts between Sub-Alternatives D-1 and D-2 are called out when necessary. Oil spills, should they occur, would also directly or indirectly affect vegetation and wetlands in the Plan Area. Oil and chemical spills and the potential for spills in the Plan Area are described in Section 4.3.

Construction Period

The construction period includes gravel placement, grading of the gravel surface, placement of all facilities, and initial drilling.

Gravel Pads, Roads, and Airstrips

Under Alternative D-1, a total of approximately 172 acres of vegetation would be covered with gravel for the construction of roads, pads, and airstrips under CPAI Development Plan Alternative D (Tables 4D.3.1-1 and 4D.3.1-2). Alternative D-2 would affect approximately 67 acres of tundra vegetation for the construction of roads, pads, and helipads. The type of vegetation loss and alteration impacts from gravel facilities and the associated mitigation measures would be the same as described under Alternative A. See Tables 4A.3.1-1, 4B.3.1-1, 4C.3.1-1, and 4D.3.1-1 for a comparison of impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, 4C.3.1-2, and 4D.3.1-2 for a comparison of impacts to habitat types in the Plan Area. In addition to impacts from roads, pads, and an airstrip, some vegetation would be lost for the construction of a boat launch ramp at either CD-2 or CD-4 and the associated access road and a floating dock and access road at CD-3 as described in Section 2.3. The vegetation and habitat types affected by construction of a boat ramp and floating dock are described under CPAI Development Plan Alternative A.

Proposed gravel sources, associated impacts, and mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Dust Fallout from Roads

Under Alternative D potential impacts from dust fallout would be greatly reduced compared to all other CPAI Development Plan alternatives because of the fewer miles of road that would be built. Potential impacts from dust under Alternative D-1 would result in a total dust coverage of about 90 acres, assuming that these impacts extend no more than 35 feet from gravel pads and roads. Sub-Alternative D-2 would require less gravel fill and would therefore result in a slightly less surface area of disturbance. Tables 4D.3.1-1 and 4D.3.1-2 summarize the surface area of vegetation and habitat types affected by dust. See Tables 4A.3.1-1, 4B.3.1-1, and 4C.3.1-1 for a comparison of dust impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, and 4C.3.1-2 for a comparison of dust impacts to habitat types in the Plan Area. The type of impacts from dust and associated mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

TABLE 4D.3.1-1 ALTERNATIVE D – SUMMARY OF SURFACE AREA (ACRES) OF VEGETATION CLASSES AFFECTED

Vegetation Classes	Colville River Delta				NPR-A (Western Beaufort Coastal Plain)			
	Loss			Alteration	Loss			Alteration
	Roads	D-1 Pads[a]	D-2 Pads[b]	D-1 Dust[c]	Roads	D-1 Pads[a]	D-2 Pads[b]	D-1 Dust[c]
Water	0.218	1.408	0.611	1.149	0.000	0.144	0.060	0.099
Riverine Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fresh Grass Marsh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fresh Sedge Marsh	0.000	0.000	0.000	0.000	0.259	2.814	1.179	1.653
Deep Polygon Complex	0.000	5.821	2.527	2.275	0.000	0.000	0.000	0.000
Young Basin Wetland Complex	0.000	0.000	0.000	0.000	0.000	6.920	2.899	2.730
Old Basin Wetland Complex	0.000	0.000	0.000	0.000	0.000	0.015	0.006	0.128
Wet Sedge Meadow Tundra	18.540	56.550	24.552	41.670	2.368	29.100	12.192	13.180
Salt-killed Wet Meadow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Halophytic Sedge Wet Meadow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Halophytic Grass Wet Meadow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Moist Sedge Shrub Tundra	0.593	0.000	0.000	0.688	0.528	13.773	5.771	7.111
Tussock Tundra	0.000	0.000	0.000	0.000	1.101	37.000	15.502	16.810
Dryas Dwarf Shrub Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cassiope Dwarf Shrub Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Halophytic Willow Dwarf Shrub Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Open and Closed Low Willow Shrub	0.631	1.864	0.809	1.298	0.000	2.600	1.089	0.453
Open and Closed Tall Willow Shrub	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dune Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Partially Vegetated	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Barrens	0.068	0.000	0.000	0.078	0.000	0.000	0.000	0.000
Total Area	20.050	65.643	28.500	47.158	4.256	92.366	38.700	42.164

Notes:

[a] Total includes gravel for production pads and airstrips.

[b] Total includes gravel for production pads and helipads.

[c] Dust impacts were calculated using a 35-foot buffer on roads, pads, and airstrips for Sub-Alternative D-1; Sub-Alternative D-2 would have slightly less impact from dust.

TABLE 4D.3.1-2 ALTERNATIVE D – SUMMARY OF SURFACE AREA (ACRES) OF HABITAT TYPES AFFECTED

Habitat Types	Colville River Delta				NPR-A (Western Beaufort Coastal Plain)			
	Loss		Alteration		Loss		Alteration	
	Roads	D-1 Pads[a]	D-2 Pads[b]	D-1 Dust[c]	Roads	D-1 Pads[a]	D-2 Pads[b]	D-1 Dust[c]
Open Nearshore Water	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Brackish Water	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tapped Lake with Low-water Connection	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tapped Lake with High-water Connection	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000
Salt Marsh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tidal Flat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Salt-killed Tundra	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deep Open Water without Islands	0.000	0.136	0.059	0.164	0.000	0.000	0.000	0.000
Deep Open Water with Islands or Polygonized Margins	0.000	1.273	0.553	0.726	0.000	0.000	0.000	0.099
Shallow Open Water without Islands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Shallow Open Water with Island or Polygonized Margins	0.000	0.000	0.000	0.000	0.000	0.144	0.060	0.000
River or Stream	0.218	0.000	0.000	0.252	0.000	0.000	0.000	0.000
Aquatic Sedge Marsh	0.000	0.000	0.000	0.000	0.259	2.814	1.179	1.653
Aquatic Sedge with Deep Polygons	0.000	5.821	2.527	2.275	0.000	0.000	0.000	0.000
Aquatic Grass Marsh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Young Basin Wetland Complex	0.000	0.000	0.000	0.000	0.000	6.920	2.899	2.730
Old Basin Wetland Complex	0.000	0.000	0.000	0.000	0.000	0.015	0.006	0.128
Riverine Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dune Complex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nonpatterned Wet Meadow	3.058	12.504	5.428	7.348	1.273	12.500	5.237	6.570
Patterned Wet Meadow	15.480	44.050	19.124	34.330	1.095	16.600	6.955	6.614
Moist Sedge-Shrub Meadow	0.593	0.000	0.000	0.688	0.528	16.370	6.859	7.564
Moist Tussock Tundra	0.000	0.000	0.000	0.000	1.101	37.000	15.503	16.810
Riverine Low and Tall Shrub	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upland Low and Tall Shrub	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upland and Riverine Dwarf Shrub[c]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Riverine or Upland Shrub[d]	0.631	1.864	0.809	1.298	0.000	0.000	0.000	0.000
Barrens (riverine, eolian, or lacustrine)	0.068	0.000	0.000	0.078	0.000	0.000	0.000	0.000
Artificial (water, fill, peat road)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Area	20.048	65.648	28.500	47.166	4.256	92.363	38.700	42.168

Notes:

[nm a] Total includes gravel for production pads and airstrips.

[b] Total includes gravel for production pads and helipads.

[c] Dust impacts were calculated using a 35-foot buffer on roads, pads, and airstrips for sub-Alternative D01; sub-Alternative D-2 would have slightly less impact from dust.

[d] Mapped for NPR-A area only.

[e] Mapped for Colville River Delta area only.

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative D-1, a total of about 260 miles of ice roads would be constructed (during the construction period) over the life of the project, resulting in a maximum of approximately 1,260 acres of vegetation disturbed. This is a maximum case scenario that assumes the ice roads would be built in a different location each year. The maximum area covered by ice roads in a single year would be 345 acres, with an average of 210 acres per year. The actual surface area disturbed would likely be much less, especially if ice roads are overlapped in subsequent years to minimize the areal extent of impacts. Ice roads placed for the construction of gravel roads and pipeline would follow adjacent to the road/pipeline routes and would tend to affect the same habitat and vegetation types (see Tables 4D.3.1-1 and 4D.3.1-2). Mitigation measures for ice roads would be the same as those described under CPAI Development Plan Alternative A.

Under Alternative D-2, a total of about 260 miles of ice roads would be constructed (during the construction period) over the life of the project, resulting in a maximum of approximately 1,260 acres of vegetation disturbed. This is a maximum case scenario that assumes the ice roads would be built in a different location each year. The maximum area covered by ice roads in a single year would be 345 acres, with an average of 210 acres per year.

In addition to ice roads, insulated ice pads would be used as staging areas during pipeline construction. Under Alternative D, approximately 66 acres of vegetation would be disturbed by ice pad staging areas for the construction of the pipeline. Ice pads could also be used to stockpile overburden material associated with the ASRC Mine Site and Clover Potential Gravel Source. Impacts from these ice pads would be the same as those described under CPAI Development Plan Alternative A. Ice pads could also be built for storage of drill rigs and other equipment at remote production pads. The effects of ice pads on vegetation would be similar in type to those of ice roads. Mitigation measures for ice pads would be the same as those described under CPAI Development Plan Alternative A.

Because of the decreased miles of gravel roads that would be constructed under Alternative D, far less snow would need to be plowed than under all other CPAI Development Plan alternatives. This would result in decreased alteration to vegetation from snow stockpiles.

Off-Road Tundra Travel

Development and operation of oil facilities in the Plan Area could require access across tundra. Such access could be necessary to respond to spills or other emergencies, conduct pipeline maintenance and repair, facilitate ice road construction, or transport supplies and equipment to roadless development sites. The types of impacts to vegetation from off-road travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Because of the mostly roadless design of Alternative D, this alternative would presumably have the greatest effect on tundra vegetation from off-road travel. Sub-Alternative D-2 proposes winter-only drilling and therefore would likely have less off-road tundra travel than Sub-Alternative D-1, which proposes summer ground access by low-ground-pressure vehicles. Off-road tundra travel impacts under Alternative B would be similar to those of Alternative C, slightly greater under Alternative A, and would likely be the lowest for Alternative D because all pads and most of the pipeline would be accessible by road.

Impoundments and Thermokarst

The types of impacts from impoundments and thermokarst and associated mitigation measures are described under CPAI Development Plan Alternative A. Habitat alteration resulting from impoundments and thermokarst would be less extensive under Alternatives B and D because of the mostly roadless designs. Alternative C could potentially affect the greatest amount of vegetation because it proposes the most miles of road.

The potential of Alternative A for impoundment and thermokarst impacts would be slightly less than that of Alternative C.

Cross-Drainage and Water Flow

Cross-drainage and water flow impacts and associated mitigation measures are described under CPAI Development Plan Alternative A. Habitat alteration resulting from interception of natural water flow by gravel roads and pads would be less extensive under Alternatives B and D because of the mostly roadless designs. The greatest area of vegetation would potentially be affected by Alternative C because it proposes the most miles of road. The potential for cross-drainage and water flow impacts in Alternative A would be slightly less than that of Alternative C.

Air Pollution

Project construction would cause a localized and temporary impact on air quality. The sources of air pollution during the construction period are described under CPAI Development Plan Alternative A. These sources are not expected to produce sufficient levels of pollutants to affect vegetation. Air Quality mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Pipelines

Given the maximum diameter of VSM borings and the projected number to be constructed under Alternative D, about 0.3 acre of vegetation would be lost to VSM installation. The vegetation and habitat types affected would depend on the exact location of the VSMs. The elevated pipeline design would reduce impacts to vegetation and habitat types.

Power Lines

Under Alternative D, power lines would be mounted on cable trays on pipeline VSMs and would not affect vegetation. See Tables 4A.3.1-1, 4B.3.1-1, 4C.3.1-1, and 4D.3.1-1 for a comparison of impacts to vegetation classes and Tables 4A.3.1-2, 4B.3.1-2, 4C.3.1-2, and 4D.3.1-2 for a comparison of impacts to habitat types in the Plan Area.

Operation Period

The operation period includes continued drilling and day-to-day operations and maintenance once production has begun.

Gravel Pads, Roads, and Airstrips

Most loss and alteration of vegetation communities would occur during the construction period and would be related to gravel placement. Additional vegetation losses could occur during the operational period during maintenance (such as snow removal) of gravel pads and airstrips or if flood events wash out portions of pads and deposit gravel downstream. The impacts of these activities/events are described under CPAI Development Plan Alternative A. Vegetation impacts resulting from maintenance of gravel facilities and wash-outs would be less extensive under Alternatives B and D because of the mostly roadless designs. The greatest area of vegetation would potentially be affected by Alternative C because it proposes the most miles of road. The impacts from maintenance of gravel roads and wash-outs in Alternative A would likely be slightly less than in Alternative C.

Dust Fallout from Roads

Although traffic is expected to be higher during the construction season, over the life of the project the impacts of dust from roads are expected to be greater during the operational period. The effects of dust on vegetation are described in the Construction Period section above.

Ice Roads, Ice Pads, and Snow Stockpiles

Under Alternative D-1, ice roads and an ice bridge would be needed every few years during the operational period to support well workovers and other drilling activities. Ice pads would not likely be needed during operations. A total of about 67 miles of ice roads would be constructed (during operations) over the life of the project, resulting in a maximum of approximately 325 acres of vegetation disturbed. This is a maximum case scenario that assumes the ice roads would be built in a different location each year. The maximum area covered by ice roads in a single year would be about 145 acres, with an average of 53 acres per year. The actual surface area disturbed would likely be much less, especially if ice roads are overlapped in subsequent years to minimize the areal extent of impacts. Ice roads placed for the construction of gravel roads and pipeline would follow adjacent to the road/pipeline routes and would tend to affect the same habitat and vegetation types (see Tables 4D.3.1-1 and 4D.3.1-2). Mitigation measures for ice roads would be the same as those described under CPAI Development Plan Alternative A.

Under Alternative D-2, a total of about 67 miles of ice roads would be constructed (during the operational period) over the life of the project, resulting in a maximum of approximately 324 acres of vegetation disturbed. This is a maximum-case scenario that assumes the ice roads would be built in a different location each year. The maximum area covered by ice roads in a single year would be 145 acres, with an average of 53 acres per year.

As during the construction period, snowdrifts or plowed snow would accumulate on tundra adjacent to roads, production pads, and airstrips. Impacts would be similar to those discussed above in the Construction Period section.

Off-Road Tundra Travel

Some off-road tundra travel would continue during the operational period to respond to spills or other emergencies, to conduct pipeline maintenance and repair, to facilitate ice road construction, or to transport supplies and equipment. See the Construction Period discussion above for potential impacts.

Impoundments and Thermokarst

Although there is a potential for some habitat loss and alteration to occur from thermokarst and the creation of impoundments during the operational period of the project, these impacts are more likely to be initiated during construction. Therefore, the factors causing vegetation loss and alteration are discussed above in the Construction Period section.

Cross-Drainage and Water Flow

Cross-drainage and water flow impacts are not expected to occur during the operational phase of this project.

Air Pollution

Air pollution levels would increase during operations with the upgrade of the existing Alpine CPF and increased emissions from traffic, drilling equipment, and well servicing equipment. However, this increase is not expected to generate levels of pollutants that would affect vegetation. Air quality impacts from emissions from

well servicing and drilling equipment would be intermittent and localized. Air quality mitigation measures would be the same as those described under CPAI Development Plan Alternative A.

Pipelines

Pipeline operation would not cause vegetation losses or alteration. However, routine maintenance and occasional larger-scale pipe repairs that could be required during the thawed season could result in additional tundra damage from equipment needed to conduct the repair work. Tundra travel is discussed above. Additionally, indirect impacts discussed above in the Construction Period section, associated with snowdrifting and shading, would continue to occur during the operational period.

Power Lines

No additional vegetation impacts would occur from power lines during the operational period.

4D.3.1.2 Alternative D – Full-Field Development Plan Impacts on Terrestrial Vegetation and Wetlands

Under FFD Alternative D, direct and indirect impacts to vegetation related to gravel fill; dust fallout from roads; ice roads and snow stockpiles; off-road tundra travel; impoundments and thermokarst; cross-drainage and water flow; air pollution; pipelines; and power lines in the three facility groups would be the same types as those described under CPAI Development Plan Alternative A. In addition to the impacts of CPAI Development Plan Alternative D-1 under the FFD scenario for Alternative D-1, approximately 816 acres of vegetation would be covered with gravel fill for the construction of production pads and airstrips with access roads. In addition to the impacts of CPAI Development Plan Alternative D-2 under the FFD scenario for Alternative D-2, approximately 400 acres of vegetation would be covered with gravel fill for the construction of production pads and helipads with access roads. Table 4D.3.1-3 summarizes the area of vegetation types affected under FFD Alternative D. The effects of FFD on terrestrial vegetation and wetlands would depend on the location and extent of development in specific locations within each area.

Colville River Delta Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative D, there would be additional vegetation loss in the Colville River Delta Facility Group from future production pads such as hypothetical production pads CD-11, CD-12, CD-14, CD-15, CD-19, CD-20, and CD-21 and their associated roads, pads, and airstrips or helipads. The dominant vegetation class in the vicinity of the Colville River Delta is Wet Sedge Meadow Tundra. Under the Alternative D-1 FFD scenario, approximately 250 acres of vegetation would be covered with gravel fill for the construction of production pads and airstrips with connecting roads in the Colville River Delta area. Under the Alternative D-2 FFD scenario, approximately 170 acres of vegetation would be covered with gravel fill for the construction of production pads and helipads with connecting roads in the Colville River Delta area. The types of disturbances and impacts to vegetation associated with gravel fill placement would be the same as those described above under CPAI Development Plan Alternative A.

Gravel extraction for the hypothetical FFD would result in the destruction of some vegetation. Specific gravel sources for the hypothetical FFD scenario have not been identified. The development process of any future gravel source would include planning, design, permitting, temporary staging areas, removal of overburden, blasting and excavation of gravel, and an approved rehabilitation plan. Analysis of impacts and appropriate mitigation measures would be examined before approval of future mine sites.

TABLE 4D.3.1-3 SUMMARY OF VEGETATION IMPACTS FOR FFD ALTERNATIVE D

VEGETATION CLASSES	COLVILLE RIVER DELTA				FISH-JUDY CREEKS				KALIKPIK-KOGRU			
	ACRES (%) IN COLVILLE RIVER DELTA		GRAVEL (ACRES)	DUST (ACRES)	ACRES (%) IN FISH-JUDY CREEK		GRAVEL (ACRES)	DUST (ACRES)	ACRES (%) IN KALIKPIK-KOGRU		GRAVEL (ACRES)	DUST (ACRES)
Riverine Complex	0	(0.0%)	0	0	30	(0.1%)	0	0	0	(0.0%)	0	0
Fresh Grass Marsh	56	(0.3%)	1	0	278	(0.6%)	2	1	49	(0.3%)	1	0
Fresh Sedge Marsh	3	(0.0%)	0	0	3,343	(7.5%)	29	15	1,483	(8.8%)	17	10
Deep Polygon Complex	550	(2.6%)	6	3	4,833	(10.9%)	42	21	1,493	(8.9%)	17	10
Young Basin Wetland Complex	0	(0.0%)	0	0	2,013	(4.5%)	17	9	721	(4.3%)	8	5
Old Basin Wetland Complex	0	(0.0%)	0	0	1,261	(2.8%)	11	6	0	(0.0%)	0	0
Wet Sedge Meadow Tundra	9,494	(44.1%)	107	44	9,856	(22.1%)	85	44	6,533	(39.0%)	73	43
Salt-killed Wet Meadow	1,633	(7.6%)	18	8	0	(0.0%)	0	0	0	(0.0%)	0	0
Halophytic Sedge Wet Meadow	1,210	(5.6%)	14	6	0	(0.0%)	0	0	0	(0.0%)	0	0
Halophytic Grass Wet Meadow	32	(0.1%)	0	0	0	(0.0%)	0	0	0	(0.0%)	0	0
Moist Sedge Shrub Tundra	782	(3.6%)	9	4	4,318	(9.7%)	37	19	0	(0.0%)	0	0
Tussock Tundra	139	(0.6%)	2	1	14,936	(33.5%)	129	66	5,452	(32.5%)	61	36
Dryas Dwarf Shrub Tundra	29	(0.1%)	0	0	238	(0.5%)	2	1	0	(0.0%)	0	0
Cassiope Dwarf Shrub Tundra	0	(0.0%)	0	0	395	(0.9%)	3	2	284	(1.7%)	3	2
Halophytic Willow Dwarf Shrub Tundra	8	(0.0%)	0	0	0	(0.0%)	0	0	0	(0.0%)	0	0
Open and Closed Low Willow Shrub	1,929	(9.0%)	22	9	520	(1.2%)	4	2	1	(0.0%)	0	0
Open and Closed Tall Willow Shrub	0	(0.0%)	0	0	172	(0.4%)	1	1	0	(0.0%)	0	0
Dune Complex	0	(0.0%)	0	0	902	(2.0%)	8	4	185	(1.1%)	2	1
Partially Vegetated	1,183	(5.5%)	13	5	412	(0.9%)	4	2	154	(0.9%)	2	1
Barrens	4,487	(20.8%)	51	21	1,030	(2.3%)	9	5	411	(2.5%)	5	3
Totals	21,536	(100.0%)	243	100	44,537	(100.0%)	384	197	16,768	(100.0%)	187	110

Notes: The proportion of vegetation types within the hypothetical circles in each facility group and the approximate acres of vegetation disturbed by gravel fill and dust were used to distribute the number of acres affected across vegetation types (assuming the vegetation types in the hypothetical circles are the distribution of habitats to be affected by the FFD Alternative D scenario).

Dust Fallout from Roads

Impacts from road dust under FFD Alternative D would be similar in type to those described for the CPAI Development Plan Alternative A. These impacts would be negligible in the Colville River Delta Facility Group, because limited road segments would exist.

Ice Roads, Ice Pads, and Snow Stockpiles

Under both sub-alternatives of Alternative D for FFD, approximately 368 miles of ice roads would be constructed in the Colville River Delta Facility Group over the life of the project (construction and operation periods), affecting approximately 1,784 acres of vegetation. The maximum area covered by ice roads in a single year would be 850 acres, with an average of 296 acres per year.

As with CPAI Development Plan Alternative D, insulated ice pads would be used as staging areas during pipeline construction, to stockpile overburden material associated with gravel mine sites, for equipment staging areas for bridge installation, and for storage of drill rigs and other equipment at remote production pads. The types of impacts to vegetation associated with ice roads and pads and associated mitigation measures would be the same as those described above under CPAI Development Plan Alternative A.

The types of impacts to vegetation associated with snow stockpiles would be the same as those described above under CPAI Development Plan Alternative A, although the construction of more roads, pads, and airstrips would result in potential increased impacts to vegetation.

Off-Road Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative D, the surface area affected would be expected to increase because of the increased length of pipeline, roads, and number of remote facilities that could require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding and the proposed mitigation measures for these impacts would be the same as those described above under CPAI Development Plan Alternative A. Under FFD Alternative D, the construction of more roads and pads would result in increased impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

Impacts from cross-drainage and water flow would be greatest in the vicinity of the Colville River Delta because of unstable flow regimes and ocean-induced storm surges. In addition, roads would likely cross many ephemeral streams in the Colville River Delta Facility Group, and culverts would need to be installed. Culvert placement could potentially disturb sheet flow in the spring and could affect local moisture regimes. Culverts allow surface water flow, but they tend to ice up and increase flow in a small area relative to typical sheet flow.

Air Pollution

No additional processing facilities would be built in the Colville River Delta area under FFD Alternative D. However, the increased traffic and equipment associated with the production pads and airstrips would potentially cause greater increased air pollution. This increase is not expected to generate levels of pollutants that would affect vegetation.

Pipelines

In addition to the impacts from CPAI Development Plan Alternative D, a total of approximately 0.1 acre of vegetation in the Colville River Delta Facility Group would be lost to VSM installation under the FFD scenario for Alternative D. The vegetation and habitat types affected would depend on the exact location of the VSM, which would be determined in the field. The types of impacts to vegetation associated with snowdrifting or shading from the aboveground pipelines would be the same as those described above under CPAI Development Plan Alternative A.

Power Lines

Under FFD Alternative D, power lines would be placed on cable trays on pipeline VSMs and would not cause any additional disturbance to vegetation.

Fish-Judy Creeks Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative D, there would be additional vegetation loss in the Fish-Judy creeks Facility Group for the construction of a processing facility; well pads CD-8, CD-9, CD-10, CD-13, CD-16, CD-17, CD-18, CD-22, CD-23, CD-24, and CD-26; and their associated roads and airstrips or helipads. Dominant vegetation classes in the Fish-Judy creeks area are *Dryas* Tundra and Wet Sedge Meadow Tundra (Table 4A.3.1-3). Under the Sub-Alternative D-1 FFD scenario, approximately 384 acres of vegetation would be covered with gravel fill in the Fish-Judy Creeks Facility Group (Table 4D.3.1-3). Under the Sub-Alternative D-2 FFD scenario, approximately 197 acres of vegetation would be covered with gravel fill in the Fish-Judy creeks area. The types of disturbances and impacts to vegetation associated with gravel fill placement would be the same as those described above under CPAI Development Plan Alternative A.

Dust Fallout from Roads

Impacts from road dust under FFD Alternative D would be similar in type to those described for the CPAI Development Plan Alternative A. These impacts would be negligible in the Fish-Judy Creeks Facility Group because road segments would be limited.

Ice Roads, Ice Pads, and Snow Stockpiles

Under both sub-alternatives of Alternative D for FFD, approximately 1,171 miles of ice roads would be constructed in the Fish-Judy Creeks Facility Group over the life of the project (construction and operation periods), affecting approximately 5,678 acres of vegetation. The maximum area covered by ice roads in a single year would be 1,008 acres, with an average of 567 acres per year.

Off-Road Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative D, the surface area affected would be expected to increase because of the increased length of pipeline, roads, and number of remote facilities that could require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding, and the proposed mitigation measures for these impacts, would be the same as those described above under CPAI Development Plan Alternative A. The construction of more roads and pads could potentially result in increased impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

The types of impacts to vegetation associated with cross-drainage and water flow would be the same as those described under CPAI Development Plan Alternative A, although the construction of more roads and culverts could potentially cause increased impacts to vegetation communities from disturbance of local water flow.

Air Pollution

The construction of an additional processing facility would result in increased levels of air pollution that could affect vegetation in the vicinity of the Fish-Judy Creeks Facility Group, as described in CPAI Development Plan Alternative A.

Pipelines

In the FFD scenario for Alternative D, approximately 0.7 acre of vegetation would be lost in the vicinity of the Fish-Judy Creeks Facility Group by VSM placement.

Power Lines

Under FFD Alternative D, power lines would be placed on cable trays on pipeline VSMs and would not cause any additional disturbance to vegetation.

Kalikpik-Kogru Rivers Facility Group

Gravel Pads, Roads, and Airstrips

In addition to habitat loss described under CPAI Development Plan Alternative D, there would be additional vegetation loss in the Kalikpik-Kogru Rivers Facility Group for the construction of a processing facility; production pads CD-8, CD-9, CD-10, CD-13, CD-16, CD-17, CD-18, CD-22, CD-23, CD-24, and CD-26; and their associated roads and airstrips or helipads The dominant vegetation classes in the Kalikpik-Kogru rivers area are Tussock Tundra and Sedge/Grass Meadow (BLM and DU 2002) (Table 4A.3.1-3). Under the Sub-Alternative D-1 FFD scenario, approximately 187 acres of vegetation would be covered with gravel fill in the Kalikpik-Kogru Rivers area (Table 4D.3.1-3). Under the Sub-Alternative D-2 FFD scenario, approximately 110 acres of vegetation would be covered with gravel fill in the Kalikpik-Kogru rivers area. The types of disturbances and impacts to vegetation associated with gravel fill placement would be the same as those described above under CPAI Development Plan Alternative A.

Dust Fallout from Roads

In the Kalikpik-Kogru Rivers Facility Group, potential impacts from dust would be negligible because a limited number of road segments would exist. The types of impacts to vegetation and mitigation measures associated with dust fallout would be the same as those described above under CPAI Development Plan Alternative A.

Ice Roads, Ice Pads, and Snow Stockpiles

Under both sub-alternatives of Alternative D for FFD, approximately 719 miles of ice roads would be constructed in the Kalikpik-Kogru Rivers Facility Group over the life of the project (construction and operation periods), affecting approximately 3,486 acres of vegetation. The maximum area covered by ice roads in a single year would be 960 acres, with an average of 873 acres per year.

Tundra Travel

The types of impacts from off-road tundra travel and associated mitigation measures would be similar to those described under CPAI Development Plan Alternative A. Under FFD Alternative D, the surface area affected would be expected to increase because of the increased length of pipeline, roads, and number of remote facilities that may require off-road tundra travel for emergencies, pipeline maintenance and repair, ice road construction, or supply transport.

Impoundments and Thermokarst

The types of impacts to vegetation associated with thermokarst and ponding and the proposed mitigation measures for these impacts would be the same as those described above under CPAI Development Plan Alternative A. Under FFD Alternative D, the construction of more roads and pads would result in increased impacts and alteration of vegetation communities from thermokarst and ponding.

Cross-Drainage and Water Flow

The types of impacts to vegetation associated with cross-drainage and water flow would be the same as those described above under CPAI Development Plan Alternative A, although the construction of more roads and culverts under FFD Alternative D would cause increased impacts to vegetation communities from disturbance of local water flow.

Air Pollution

The construction of an additional processing facility in the Kalikpik-Kogru rivers area would result in increased levels of air pollution that could affect vegetation, as described in CPAI Development Plan Alternative A.

Pipelines

In the FFD scenario for Alternative D, approximately 0.4 acre of vegetation would be lost in the Kalikpik-Kogru rivers area by VSM placement. The types of impacts to vegetation associated with snow drifting or shading from pipeline placement would be the same as those described above under CPAI Development Plan Alternative A.

Power Lines

Under FFD Alternative D, power lines would be placed on cable trays on pipeline VSMs and would not cause any additional disturbance to vegetation.

4D.3.1.3 Alternative D – Summary of Impacts (CPAI and FFD) on Terrestrial Vegetation and Wetlands

Impacts from CPAI Development Plan Alternatives A through D to vegetation and habitat types are summarized in Tables 4D.3.1-1 and 4D.3.1-2, respectively. Impacts from FFD Alternative D are summarized in Table 4D.3.1-3.

4D.3.1.4 Alternative D – Potential Mitigation Measures (CPAI and FFD) for Terrestrial Vegetation and Wetlands

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.1).

4D.3.2 Fish

Aspects of Alternative D different from Alternative A that are relevant to potential impacts on fish include elimination of gravel roads for access to production pads; HDD to install the pipeline under the Nigliq Channel (rather than a pipeline bridge over the channel); and installation of power lines on the pipeline VSMs, eliminating the need for power poles. Because the Alternative D pipeline route is the same as that in Alternative A, the potential impacts of the two alternatives would, with minor exceptions (for example, the CD-4 pad-airstrip road), be in the same geographic areas. Because Alternative A does not include a road to CD-3, impacts and mitigation relating to alteration and loss of habitat, obstruction of fish passage, and increased human access described for Alternative A apply here.

Because there are no roads connecting the sites, Alternative D includes aircraft landing areas at or near each production pad, with two variants: Sub-Alternative D-1 would construct an airstrip near each of the five production pads, with a gravel road connecting each airstrip to the production pad it services; Sub-Alternative D-2 would include a helipad at each of the five production pads. Most of the potential impacts to fish from Sub-alternatives D-1 and D-2 would be identical or nearly so. Therefore, unless otherwise indicated, the discussion below applies to both sub-alternatives.

As in Alternative A, the primary concern in the Plan Area is maintaining winter habitat. Maintaining suitable feeding and spawning areas and access to these areas, which are often in different geographic locations; water withdrawal; alteration of flow patterns; release of contaminants during the life of the project; and the impacts of oil spills are likewise of concern.

Impacts of and measures to prevent, control, and mitigate spills are addressed in Section 4.3. Further, that section includes an assessment of the effects of the project on marine fish and habitats. Normal construction and operation impacts for this alternative would not be expected to have measurable impacts on Harrison Bay and nearshore Beaufort Sea environments and biota.

4D.3.2.1 Alternative D – CPAI Development Plan Impacts on Fish

Construction Period

Airstrips, pipelines, and pads would be constructed during winter, and well-drilling operations could occur year-round. If construction were to occur in high-density spawning and overwintering areas, or during summer in migratory corridors, it could affect a relatively large number of freshwater and migratory fish. Potential impacts of construction under those conditions would include degradation or loss of overwintering habitat, partially blocked access to and from summer feeding areas and wintering areas, and siltation in or near these habitats. The scope of such impacts may range up to spawning failure and/or fish mortality.

Water Withdrawal

The main potential impact of construction on fish would be from water withdrawal to support construction of drill pads, airstrips, and pipelines. Water would be needed for building ice roads along the proposed pipeline route and for camp operations. In addition to water withdrawal, CPAI would use frozen lakes for ice chips. Details of the effects of water withdrawal on fish are as described for Alternative A (Section 4A.3.2). Lakes that have been identified as potential winter water sources for ice road construction and other uses are shown in Table 4A.3.2-1. Figure 3.3.2.2-1 shows the fish-bearing lakes in the Plan Area and indicates which contain fish that are not resistant to the low dissolved oxygen concentrations that could result from water withdrawal; the depths of those lakes relative to Alternative D are shown in Figure 4D.3.2-1.

Best management practices would be implemented during water withdrawals. CPAI would monitor each water withdrawal to ensure winter water use does not exceed permit limits and that water quality standards are met. In addition, large and deep lakes would be targeted as water sources to allow a margin of safety for maintaining sufficient water volumes to minimize impacts on fish. Shallow lakes that do not contain fish also would be used as water sources before they freeze. No impacts to fish are expected if CPAI adheres to the water withdrawal permit conditions.

Gravel Mining

To provide road and pad material, gravel will be mined at locations to be determined. Details are described for Alternative A (Section 4A.3.3.1.1), but gravel needs for Alternative D will be much less than for Alternative A. Furthermore, the gravel needs for Sub-Alternative D-1 (airstrips) would be greater than those for Sub-Alternative D-2 (helipads). If gravel mining activities occur outside overwintering or spawning areas, little or no adverse effects to fish would be expected. A mitigation that may yield long-term benefits after project completion is conversion of the gravel pits to fish habitat (Section 4A.3.3.1.1).

Pipelines

The pipeline crossing the Nigliq Channel would be installed by HDD. This would avoid impacts to the Nigliq Channel unless there were an inadvertent release of drilling mud.

Other water crossings would be sufficiently short that they would cross the watercourses on VSMs and in-stream work would not be required. Impacts from construction of these pipeline bridges are generally as described in Section 4A.3. If instream piers are required, sediment/turbidity plumes could result as described in 4A.3 (under "Bridges"). Given that construction activities would be in the winter and overwintering habitats would be largely avoided, it is expected that pipeline construction under Alternative A would have no measurable effect on arctic fish populations in the Plan Area.

Pads, Roads, and Airstrips

Lakes M9622 and MC7911 are frequently flooded, perched lakes to the north and south of the proposed CD-4 airstrip. Both are sufficiently deep (about 20 feet) to provide significant overwintering habitat. Broad whitefish and least cisco have been documented to reside in both of these lakes, with humpback whitefish and round whitefish also in Lake MC7911. CD-6 would be in the Fish Habitat LUEA described by the Northeast NPR-A Final IAP/EIS (BLM and MMS 1998a) and ROD (BLM and MMS 1998b).

Otherwise, construction of pads, roads, and airstrips is likely to have no measurable adverse effect on arctic fish populations because construction is scheduled to occur in winter in low-diversity areas sparsely inhabited by large fish and not during times when migratory fish are moving to and from freshwater habitats. Further, construction has been designed to minimize siltation effects and impacts on fish passage.

Gravel placed for production pads, roads, and airstrips could eliminate some fish habitat. The pads might be somewhat larger than in Alternative A because they would not have year-round road access so would need more room for storage of equipment and supplies. However, because there would be no inter-pad road system, the amount of gravel required and in turn the amount of habitat eliminated would be far less than that for Alternative A. The CD-4 pad-airstrip road would place gravel over some small, shallow wetland ponds that would not contain fish during winter but might support ninespine sticklebacks in summer.

Bridges

There likely would be a 40-foot road bridge over the Sakoonang Channel on the CD-4 pad-airstrip-road. This is expected to completely span the watercourse, and it would be installed in winter when the water would be

frozen and no fish would be present. Therefore, no effects on fish are anticipated to result from bridge construction at this site.

A bridge over an existing pipeline is proposed very near CD-4; because this does not involve a water crossing, no impacts to fish are expected.

Culverts

Culverts are not proposed for Alternative D. However, Alternative D would have no road, so the impacts of a road and culvert crossing of lake L9324 would not occur. Should any culverts be installed on pad-airstrip roads, potential construction impacts (for example, sedimentation resulting from bottom disturbance and gravel) would be similar to those described for Alternative A (Section 4A.3).

Boat Ramps and Docks

Construction of boat ramps and docks, should any be needed for spill response purposes, may have instream impacts similar to those of bridge construction.

Power Lines

Power lines would be installed on the pipeline VSMs; pipeline construction impacts to fish are addressed above.

Human Access

The availability of the ice roads during winter construction would increase human access to the Ublutuoch River, the Fish Creek drainage, and the Colville River Delta. Increased fishing pressure may result.

Operation Period

Pipelines

The normal operation of the pipelines should have only negligible effects on fish habitat or fish movement corridors. Fish habitat would not be lost or altered by the presence of VSM-mounted pipes. Because most planned maintenance and repair activities would occur in the frozen season to allow ground access to pipelines, little impact would be expected.

Should urgent repairs be needed when the ground is not frozen, impacts to fish habitat may result from vehicles accessing the repair site(s). Such vehicular access for emergency maintenance would necessitate traveling over unfrozen tundra; however, impacts to fish would still be expected to be minimal and short term (for example, minor sedimentation as low-ground-pressure vehicles pass through drainages)

Pads, Roads, and Airstrips

The absence of roads in this alternative reduces impacts on fish to only those associated with the pads and airstrip. The main exception is the airstrip and road associated with CD-4, which could redirect flow and thus alter habitat and fish movements in that area. Alteration of drainage patterns on a landscape scale would not be a concern in Alternative D, compared to Alternative A with its extensive road system.

Otherwise, the nature of operational impacts would be the same as those for Alternative A (Section 4A.3). Maintenance of road surfaces at or near water crossings could increase the amount of suspended sediments, resulting in degradation of water quality and fish habitat.

Ice roads would have to be made during construction and drilling and every few years during operations, including an ice bridge across the Nigliq Channel each winter. Construction of an ice road or an airstrip on fish overwintering areas could cause freezing to the bottom and form a barrier to water circulation. This would result in reduced dissolved oxygen levels. Further, erosion and runoff from gravel pads, airstrips, and roads could cause sedimentation in water bodies, resulting in smothering of physical habitat, avoidance, reduced feeding, and lessened tolerance to disease. CPAI would remove snow from the road surface to minimize runoff, road erosion, and tundra silting during the spring melt.

Bridges

The only bridge in Alternative D would be the Sakoonang Channel bridge near CD-4. No impacts to fish would be expected from this bridge.

Culverts

No culverts have been proposed for Alternative D. Should any be proposed, they would be designed to maintain adequate water flow and fish passage. Downstream channel morphology changes would be a concern with any culvert crossing of a watercourse. Potential culvert failure could block downstream flow and obstruct fish movement. These impacts are discussed in more detail in Section 4A.3.

Human Access

Because it is a roadless development scenario, Alternative D has the least potential of any of the alternatives to increase human access into the development area. Winter ice roads could facilitate access to remote areas (Ublutuoch River, Fish Creek, Judy Creek) and thus may increase winter fishing pressure.

It is possible that the project might create a limited number of new jobs, which may attract new residents from Barrow or other North Slope villages to reside permanently in Nuiqsut and use local fishery resources. The expected small magnitude of the potential increase in subsistence users that would be attributable to the development makes it unlikely that there would be adverse effects on the subsistence fishery. Furthermore, the project would not increase fishing competition between residents and local non-residents because CPAI has agreed to apply a no-fishing/hunting policy to non-resident workers.

4D.3.2.2 Alternative D – FFD Impacts on Fish

The hypothetical FFD design for Alternative D is along the same alignment as that of Alternative A. The number of production pads and processing facilities proposed is the same as described for Alternative A. Therefore, potential impacts to fish would be in the same geographic areas as those for Alternative A. The differences are that there are no roads in Alternative D; each facility has a corresponding airstrip or helipad. This is the least obtrusive of all the FFD designs.

Types of impacts of future development in the Plan Area generally would be of a similar nature to those described above for the five-pad CPAI proposal (see Section 4D.3.2.1). However, development on the scale postulated will, depending on precise siting, destroy or alter fish habitat substantially more than CPAI's five-pad proposal. Overwintering, rearing, migration, and spawning habitats would be affected but to a far lesser extent than for Alternative A because there would be no inter-pad road system. In particular, there would be no concerns about landscape-scale drainage alterations as in Alternative A (Section 4A.3).

Periodic ice road construction might promote winter access to remote areas and thus increase winter fishing pressure at overwintering sites. However, the lack of an inter-pad road network (such as that in Alternative A) suggests that this would be on a scale far less than for Alternative A. Conversely, some traditional users of the area may chose other locations to avoid industrial activity altogether.

Withdrawal of fresh water necessary to support this scale of infrastructure development plus well drilling should not affect fish if withdrawals are done in compliance with permit restrictions. The cumulative effects of this FFD scenario are expected to be similar to effects from current developments. Future mitigation measures are expected to be successful based on the impacts of previous projects to fish habitat.

The following subsections summarize concerns specific to facility groups.

Colville River Delta Facility Group

In the Colville River Delta, seven new production pads are hypothesized. Of particular note are production pads CD-19 and CD-21 on the eastern side of the outer Delta, which are in vicinity of the commercial (Helmericks) fishery as well as subsistence fisheries. Spills, addressed in Section 4.5, would be a major concern of these two hypothetical facilities.

No roads are hypothesized in this part of the Plan Area except short pad-airstrip roads. Pipelines would be constructed over several major watercourses including the Elaktoveach Channel, Kupigruak Channel, Tamayayak Channel, and the main stem of the Colville River. Instream construction activities at these water bodies would have the potential to cause impacts as described in 4D.3.2.1.

Fish-Judy Creeks Facility Group

Eleven new pads plus one new processing facility in the Fish Creek watershed (including Judy Creek and the Ublutuoch River) are hypothesized.

Several facilities would be situated in sensitive areas as designated by BLM and MMS (1998a): CD-8, CD-23, CD-24, and APF-2 in the Fish and Judy creek drainages and CD-18 near the Colville River. Fish habitats in these drainages are important for spawning, migration, rearing, and overwintering for anadromous and resident species. This may affect subsistence users who do not like to fish near development, especially industrial development. Spills, addressed in Section 4.3, would be a major concern when facilities are placed in sensitive areas.

Kalikpik-Kogru Rivers Facility Group

Four new pads and one new processing facility in the Kalikpik-Kogru river drainages are hypothesized. Only minor impacts from pad and airstrip installation would be expected.

4D.3.2.3 Alternative D – Summary of Impacts (CPAI and FFD) on Fish

Construction impacts are considerably reduced under Alternative D because no roads are proposed.

In summary, this alternative is expected to have the lowest level of construction impacts of all the alternatives in regard to alteration and loss of fish habitat, obstruction of fish passage, and increased human access to fish resources. Similarly, the need for mitigation would be reduced.

Within the Plan Area, the primary impacts of concern are those that affect winter habitat, as well as those affecting feeding and spawning areas and access to these areas. Water withdrawal for winter construction, if not limited, could create overcrowding and reduce the available pool of dissolved oxygen in a water body, with fish mortality a possible result. Permit limits on amounts of water withdrawn are set to avoid such impacts. Low dissolved oxygen could also result from suspension of oxygen-demanding materials during construction of the Nigliq Channel pipeline bridge.

Construction of pads, roads, and pipelines is likely to have no measurable adverse effect on arctic fish populations. Construction of ice roads or airstrips on fish overwintering areas could cause freezing to the bottom and

block fish movement. Ice roads could facilitate increased human access to fish overwintering areas, potentially increasing subsistence fishing pressures.

Gravel mining would most likely have direct impacts if it were to occur within the floodplains of rivers. Sedimentation from erosion could affect fish and other aquatic organisms by interfering with respiration and vision and by smothering benthic habitat.

Release of contaminants over the project duration and the impacts of oil spills are important concerns to fish resources; these issues are addressed in Section 4.3.

Essential Fish Habitat

This alternative would have the least potential for adverse impacts on salmon EFH because no gravel roads of consequence would be necessary, and the pipeline would be run under the Nigliq Channel using HDD methods rather than over the channel via a bridge. The potential impacts from Alternative D to fish in general are described in Section 4D.3.. See Section 4.3 for a discussion of the potential for oil releases to occur in an under-channel pipeline.

Furthermore, because essentially all of the Plan Area is north of 70° N latitude (see Section 3.3.7.1), and there is marginal habitat to sustain populations, EFH is unlikely to be affected by either CPAI Development Project Alternative D or FFD Alternative D.

4D.3.2.4 Alternative D – Potential Mitigation Measures (CPAI and FFD) for Fish

1. At project completion, gravel mines should be converted to fish habitat, if practicable.
2. Ice roads and airstrips should avoid fish overwintering areas.
3. Silt fencing (or an equivalent measure) should be installed, routinely and frequently inspected, and properly maintained at any sites where silt may enter a water body.
4. For the HDD pipeline crossing of the Nigliq Channel, CPAI should provide a plan, subject to the review and approval of the AO, that includes (1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction; (2) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and (3) a contingency plan for crossing the water body or wetland in the event the directional drill is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

4D.3.3 Birds

4D.3.3.1 Alternative D – CPAI Development Plan Impacts on Birds

Tables 4D.3.3-1 and 4D.3.3-2 present the number of potential nests displaced by habitat loss or alteration and disturbance for CPAI Development Plan Alternatives D-1 and D-2 by bird species and species group.

Loons and Waterfowl

At the CD-5 site, the airstrip would be near wetlands immediately west of the site as described under Alternative B. These wetlands support nesting red-throated and Pacific loons, tundra swans, white-fronted and Canada geese, brant, and several duck species including king eider (Burgess et al. 2003b), and impacts on waterfowl and loons would be the same as those described under Alternative B. The airstrip at CD-6 would be in a dry upland area where small numbers of white-fronted geese, northern pintails, and long-tailed ducks were reported nesting (Burgess et al. 2003b). The airstrip at the CD-7 site could affect nesting Pacific and yellow-

billed loons and small numbers of northern pintails, long-tailed ducks, and king eiders nesting in wetlands north of the proposed airstrip (Burgess et al. 2003b).

Construction Period

Habitat Loss and Alteration

Under Alternative D, all production pads would be the same as those proposed under Alternative A, but most of the roads would be eliminated and each site would be developed with aircraft and ice-road access. The footprint of the production pads at each site would be larger under Alternative D, and gravel placement for airstrips would further increase the amount of tundra lost as waterfowl and loon habitat in the immediate area of each pad site. However, the total area of tundra covered by gravel within the Plan Area would be reduced. Reduction in gravel placement by elimination of the connecting roads would cause a decrease of 2 to 11 waterfowl and loon nests in Alternative D compared to Alternatives A-C (Table 4A.3.3-1). Annual ice roads and the ice bridge across the Nigliq Channel during drilling could alter availability of nesting habitat by late meltout and alteration of water flows. Ice road requirements would be increased in Alternative D compared to Alternatives A-C because of the roadless nature of this alternative, resulting in the displacement of 1 to 2 additional waterfowl and loon nests. The types of impacts associated with gravel placement for waterfowl and loons in Alternative D would be the same as those described under Alternative A.

Patterned Wet Meadow waterfowl and loon nesting habitat in the Colville River Delta in Alternative D would have additional gravel cover compared to Alternatives A and B (Table 4D.3.3-2). Deep Open Water with Islands or Polygonized Margins and Moist Sedge Shrub Meadow nesting habitats would have reduced gravel cover compared to Alternatives A-C. More Aquatic Sedge Marsh habitat would be covered by gravel in Alternative D than in Alternative A, although impacts to this habitat type are reduced in Alternative D compared to Alternatives B and C. In all instances, habitat impacts in Alternative D would affect less than 1 percent of habitats used by waterfowl and loons and available in the Colville River Delta or in the NPR-A portion of the Plan Area (Table 4D.3.3-3).

TABLE 4D.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE D-1 – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	Nest Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Waterfowl and Waterbirds										
Greater white-fronted goose	1.7	0.8	0.9	0.2	0.1	3.7	0.0	3.8	19.0	26.6
Snow goose	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada goose	0.0	0.0	0.4	0.0	0.0	0.4	0.0	1.0	4.3	5.7
Brant	0.3	0.0	0.2	0.0	0.0	0.5	0.0	0.5	2.4	3.5
Tundra swan	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.2	1.2	1.5
Mallard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern shoveler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6
Northern pintail	0.0	0.2	0.0	0.0	0.2	0.5	0.0	0.7	3.6	4.8
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3
Greater scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3
Lesser scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
King eider	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.3	1.3	1.8

TABLE 4D.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE D-1 – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	Nest Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Waterfowl and Waterbirds										
Long-tailed duck	0.2	0.0	0.0	0.1	0.1	0.4	0.0	0.6	2.8	3.8
Waterfowl Total	**2.4**	**1.1**	**1.7**	**0.3**	**0.4**	**5.9**	**0.0**	**7.4**	**35.5**	**48.8**
Loons										
Red-throated loon	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.7	1.0
Pacific loon	0.1	0.1	0.1	0.0	0.1	0.5	0.0	0.7	3.6	4.8
Yellow-billed loon	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.5	0.6
Loon Total	**0.3**	**0.1**	**0.2**	**0.0**	**0.1**	**0.7**	**0.0**	**1.0**	**4.7**	**6.4**
Ptarmigan										
Willow ptarmigan	0.1	0.3	0.1	0.1	0.0	0.6	0.0	0.7	3.7	5.0
Rock ptarmigan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ptarmigan Total	**0.1**	**0.3**	**0.1**	**0.1**	**0.0**	**0.6**	**0.0**	**0.7**	**3.7**	**5.0**
Seabirds										
Parasitic jaeger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6
Long-tailed jaeger	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.5	0.7
Glaucous gull	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.3	1.4	1.9
Sabine's gull	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.2	0.7	1.1
Arctic tern	0.1	0.1	0.1	0.0	0.0	0.3	0.0	0.4	2.1	2.7
Seabird Total	**0.3**	**0.1**	**0.2**	**0.0**	**0.2**	**0.8**	**0.0**	**1.1**	**5.1**	**7.0**
Shorebirds										
Black-bellied plover	0.3	0.3	0.2	0.0	0.2	0.9	0.0	2.5	0.0	3.4
American golden-plover	0.4	0.4	0.3	0.6	0.0	1.6	0.0	1.8	0.0	3.4
Bar-tailed godwit	0.1	0.1	0.2	0.3	0.0	0.6	0.0	0.6	0.0	1.2
Semipalmated sandpiper	3.3	3.4	1.4	0.6	0.7	9.4	0.0	16.1	0.0	25.6
Baird's sandpiper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
Pectoral sandpiper	6.3	6.5	2.4	1.4	2.3	19.0	0.0	21.7	0.0	40.7
Dunlin	0.2	0.2	0.3	0.3	0.0	1.0	0.0	1.8	0.0	2.9
Stilt sandpiper	0.3	0.3	1.1	0.0	0.0	1.7	0.0	2.2	0.0	3.8
Buff-breasted sandpiper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1
Long-billed dowitcher	0.5	0.5	1.2	0.6	0.4	3.2	0.0	6.0	0.0	9.3
Red-necked phalarope	1.6	1.6	1.2	0.9	1.9	7.2	0.0	8.7	0.0	15.9
Red phalarope	1.1	1.1	0.8	0.0	0.3	3.2	0.0	4.1	0.0	7.3
Shorebird Total	**13.9**	**14.5**	**9.0**	**4.6**	**5.9**	**35.3**	**0.0**	**66.8**	**0.0**	**114.8**
Passerines										
Yellow wagtail	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.4

TABLE 4D.3.3-1 CPAI DEVELOPMENT PLAN ALTERNATIVE D-1 – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE (CONT'D)

	Nest Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Passerines										
Savannah sparrow	0.4	0.4	0.0	0.0	0.4	1.2	0.0	1.8	0.0	3.0
Lapland longspur	6.3	6.6	2.9	2.9	2.9	21.6	0.0	30.9	0.0	52.6
Common redpoll	0.1	0.1	0.0	0.3	0.0	0.4	0.0	0.9	0.0	1.3
Passerine Total	**6.8**	**7.1**	**2.9**	**3.2**	**3.4**	**23.3**	**0.0**	**33.9**	**0.0**	**57.3**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip for waterfowl, loons, and seabirds. No disturbance was evident for shorebirds and passerines (Johnson et al. 2003a).

TABLE 4D.3.3-2 CPAI DEVELOPMENT PLAN ALTERNATIVE D-2 – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

	Nest Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Waterfowl and Waterbirds										
Greater white-fronted goose	0.6	0.3	0.4	0.1	0.1	1.5	0.0	3.8	11.0	16.3
Snow goose	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada goose	0.0	0.0	0.2	0.0	0.0	0.2	0.0	1.0	2.5	3.7
Brant	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.5	1.4	2.2
Tundra swan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.9
Mallard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northern shoveler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4
Northern pintail	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.7	2.1	3.0
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Greater scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Lesser scaup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
King eider	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.8	1.1
Long-tailed duck	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.6	1.6	2.4
Waterfowl Total	**0.8**	**0.4**	**0.8**	**0.2**	**0.2**	**2.4**	**0.0**	**7.4**	**20.6**	**30.4**
Loons										
Red-throated loon	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.4	0.6
Pacific loon	0.0	0.0	0.1	0.0	0.1	0.2	0.0	0.7	2.1	3.0
Yellow-billed loon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4
Loon Total	**0.1**	**0.0**	**0.1**	**0.0**	**0.1**	**0.3**	**0.0**	**1.0**	**2.7**	**4.0**
Ptarmigan										
Willow ptarmigan	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.7	2.1	3.1

TABLE 4D.3.3-2 CPAI DEVELOPMENT PLAN ALTERNATIVE D-2 – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE (CONT'D)

	Nest Loss from Gravel Placement						Habitat Alteration		Disturbance	
Species	**CD-3**	**CD-4**	**CD-5**	**CD-6**	**CD-7**	**Total**	**Dust**	**Ice Roads**	**Airstrip[a]**	**Total**
Rock ptarmigan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ptarmigan Total	**0.0**	**0.1**	**0.0**	**0.1**	**0.0**	**0.2**	**0.0**	**0.7**	**2.2**	**3.1**
Seabirds										
Parasitic jaeger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4
Long-tailed jaeger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4
Glaucous gull	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.8	1.2
Sabine's gull	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.4	0.7
Arctic tern	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	1.2	1.7
Seabird Total	**0.1**	**0.0**	**0.1**	**0.0**	**0.1**	**0.3**	**0.0**	**1.1**	**3.0**	**4.4**
Shorebirds										
Black-bellied plover	0.1	0.1	0.1	0.0	0.1	0.4	0.0	2.5	0.0	2.8
American golden-plover	0.1	0.1	0.2	0.3	0.0	0.7	0.0	1.8	0.0	2.5
Bar-tailed godwit	0.0	0.0	0.1	0.2	0.0	0.3	0.0	0.6	0.0	0.9
Semipalmated sandpiper	1.2	1.2	0.7	0.3	0.4	3.7	0.0	16.1	0.0	19.9
Baird's sandpiper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
Pectoral sandpiper	2.2	2.2	1.2	0.8	1.2	7.6	0.0	21.7	0.0	29.4
Dunlin	0.1	0.1	0.2	0.2	0.0	0.5	0.0	1.8	0.0	2.3
Stilt sandpiper	0.1	0.1	0.5	0.0	0.0	0.7	0.0	2.2	0.0	2.9
Buff-breasted sandpiper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1
Long-billed dowitcher	0.2	0.2	0.6	0.3	0.2	1.5	0.0	6.0	0.0	7.5
Red-necked phalarope	0.6	0.6	0.6	0.5	1.0	3.1	0.0	8.7	0.0	11.9
Red phalarope	0.4	0.4	0.4	0.0	0.2	1.3	0.0	4.1	0.0	5.4
Shorebird Total	**5.0**	**5.0**	**4.5**	**2.4**	**3.0**	**19.8**	**0.0**	**66.8**	**0.0**	**86.7**
Passerines										
Yellow wagtail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4
Savannah sparrow	0.1	0.1	0.0	0.0	0.2	0.5	0.0	1.8	0.0	2.3
Lapland longspur	2.3	2.3	1.4	1.5	1.5	9.0	0.0	30.9	0.0	39.9
Common redpoll	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.9	0.0	1.1
Passerine Total	**2.4**	**2.4**	**1.4**	**1.7**	**1.7**	**9.7**	**0.0**	**33.9**	**0.0**	**43.6**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip for waterfowl, loons, and seabirds. No disturbance was evident for shorebirds and passerines (Johnson et al. 2003a).

Disturbance and Displacement

Disturbances from vehicle traffic would be reduced in Alternative D compared to Alternatives A-C. Some vehicular traffic would occur on production pads and on access roads from production pads to airstrips. The roadless nature of Alternative D could lead to increased requirements for tundra travel during both summer and winter. Ground access during the summer would potentially disturb waterfowl and loons.

Disturbance from air traffic would be increased in Alternative D compared to Alternatives A-C by the additions of airstrips at all pad locations. This increase in disturbance would lead to the potential displacement of an additional 5 to 41 waterfowl and loon nests in Alternative D compared to Alternatives A-C. Potential displacement could be reduced in Alternative D-2 by the reduction in the helipad area and the resulting noise buffer surrounding the helipad for an additional zero to 24 waterfowl and loon nests displaced compared to Alternatives A-C. Associated hazing of waterfowl and loons from the airstrip areas would cause additional disturbance.

Obstructions to Movement

Under Alternative D, any potential obstructions to waterfowl and loon movements related to the presence of gravel roads would be reduced when compared to Alternatives A-C because of the elimination of roads under the alternative.

TABLE 4D.3.3-3 ALTERNATIVE D – SUMMARY OF AFFECTED HABITAT TYPES USED BY WATERFOWL AND LOONS[A]

Habitat Type	Colville River Delta						NPR-A					
	Acres in Colville River Delta[b]	Loss or Alteration[c] (Acres and %)		Waterfowl (10 species)			Acres in NPR-A[d]	Loss or Alteration[c] (Acres and %)		Waterfowl (9 species)		
				Nesting (10)	Brood-rearing (10)	Staging (3)				Nesting	Brood-rearing (6)	Staging (1)
Open Nearshore Water	2,476					1	840					
Brackish Water	1,614			2	6	2	331					
Tapped Lake with Low-water Connection	5,342	21	(0.4%)		3	1	420					
Tapped Lake with High-water Connection	5,132	12	(0.2%)	1	4		17					
Salt Marsh	4,090	5	(0.1%)	1	1	1	902					
Tidal Flat	13,841					1	2,021					
Salt-killed Tundra	6,336			5		1	35					
Deep Open Water without Islands	5,132	1	(0.0%)	2	7		12,343	3	(0.0%)		5	1
Deep Open Water with Islands or Polygonized Margins	19,1756	11	(0.0%)	5	6	1	8,950			3	3	1
Shallow Open Water without Islands	499	1	(0.2%)		1		1,737	2	(0.1%)	1		
Shallow Open Water with Island or Polygonized Margins	133			1	2		2,824	1	(0.0%)	4	1	
River or Stream	20,280	8	(0.0%)			1	1,525					
Aquatic Sedge Marsh	32						2,854	6	(0.2%)	3	2	
Aquatic Sedge with Deep Polygons	3,267	2	(0.1%)	8	3		74					
Aquatic Grass Marsh	358	9	(2.5%)		1		487			1	1	
Young Basin Wetland Complex							623	9	(1.5%)			
Old Basin Wetland Complex	2						15,118	33	(0.2%)	2	1	1

TABLE 4D.3.3-3 ALTERNATIVE D – SUMMARY OF AFFECTED HABITAT TYPES USED BY WATERFOWL AND LOONS[A]

Habitat Type	Colville River Delta						NPR-A					
	Acres in Colville River Delta[b]	Loss or Alteration[c] (Acres and %)		Waterfowl (10 species)			Acres in NPR-A[d]	Loss or Alteration[c] (Acres and %)		Waterfowl (9 species)		
				Nesting (10)	Brood-rearing (10)	Staging (3)				Nesting	Brood-rearing (6)	Staging (1)
Riverine Complex							687	1	(0.1%)			
Dune Complex							1,876					
Nonpatterned Wet Meadow	10,265	22	(0.2%)	4			5,305	15	(0.3%)	1	1	
Patterned Wet Meadow	25,361	119	(0.5%)	8			19,487	47	(0.2%)			1
Moist Sedge-Shrub Meadow	3,262	29	(0.9%)	2			39,920	144	(0.4%)	1		1
Moist Tussock Tundra	630						47,101	226	(0.5%)	3		
Riverine Low and Tall Shrub		3		1			1,794					
Upland Low and Tall Shrub							692					
Upland and Riverine Dwarf Shrub[b]							2,217					
Riverine or Upland Shrub[c]	6,815	13	(0.2%)				0					
Barrens (riverine, eolian, or lacustrine)	19,440	11	(0.1%)				1,690					
Artificial (water, fill, peat road)	96						0					
Total Area	136,323	264	(0.2%)				171,869	488	(0.3%)			

Notes:

[a] Numbers of species using habitats by life history stage.

[b] Mapped for Colville River Delta area only.

[c] Total includes gravel for pads and airstrips and area affected by dust.

[d] Mapped for NPR-A area only.

Mortality

Under Alternative D, the potential for loon and waterfowl mortality from collisions with vehicular traffic or bridges would be reduced when compared to Alternatives A-C because of the elimination of roads and bridges. Mortality from collisions with aircraft would be increased by the addition of airstrips at all pad locations under Alternative D.

Operation Period

Habitat Loss and Alteration

Some habitat loss or alteration from snowdrifts, gravel spray, dust fallout, thermokarst, and ponding would continue during project operation. Habitat alterations from dust fallout would be reduced in Alternative D compared to Alternatives A-C because of the roadless nature of this alternative. Habitat alterations from use of low-ground-pressure vehicles during summer or winter would be increased in Alternative D compared to Alternatives A-C because of the lack of road access to most facilities.

Disturbance and Displacement

Disturbance from vehicle traffic would be nearly eliminated in Alternative D compared to Alternatives A-C with the elimination of connecting roads. Disturbance from air traffic would be increased in Alternative D compared to Alternatives A-C by the addition of airstrips at all pad locations. Potential disturbance for Alternative D-2 could be reduced from Alternative D-1 by the reduction in the area exposed to disturbance because of the reduced size of the helipad. More traffic would be expected, however, with Alternative D-2 because of the reduced payload for most helicopters compared to fixed-wing aircraft.

Obstructions to Movement

Potential obstructions to movements of waterfowl and loon broods across roads would continue during project operation. This potential obstruction would be very low for Alternative D because of the roadless nature of this alternative.

Mortality

Potential mortality resulting from collisions with vehicles would be very low in Alternative D compared to Alternatives A-C because of the lack of road connections between facilities. Mortality from collisions with aircraft would be increased in Alternative D compared to Alternatives A-C because of the addition of airstrips at all pad locations. Potential mortality from collisions with power lines would be eliminated in Alternative D by the placement of all power lines on VSMs. Potential mortality resulting from depredation by raptors, ravens, or seabirds could also be increased in Alternative D compared to Alternatives A or B by the increased vantage from the 7-foot versus the 5-foot elevation of the pipeline.

Ptarmigan

Construction Period

Habitat Loss, Alteration, or Enhancement

Under Alternative D, the footprint of the production pads at each site would be larger than that proposed for Alternative A, and gravel placement for airstrips would further increase the amount of tundra potentially lost as ptarmigan habitat in the immediate area of each site. However, the elimination of most of the roads under Alternative D and general reduction in gravel fill would reduce the amount of habitat affected in Alternative D compared to Alternatives A-C.

Habitat loss resulting from gravel fill would result in similar numbers of ptarmigan nests displaced compared to Alternatives A and B and one fewer ptarmigan nest affected by dust fallout compared to Alternative D. Less area of Patterned Wet Meadow and Moist Sedge-Shrub Meadow habitats used by ptarmigan for nesting and brood-rearing would be covered by gravel fill in Alternative D compared to Alternatives A-C (Table 4D.3.3-2).

Disturbance and Displacement

Under Alternative D, potential disturbance to ptarmigan by vehicular traffic would be reduced compared to Alternatives A-C, while the potential for disturbance from aircraft would be increased by two to four ptarmigan nests for Alternative D-1 and zero to two nests for Alternative D-2.

Obstruction to Movement

The elimination of the road systems connecting pad sites would likely decrease any potential obstruction to ptarmigan brood movements in the Plan Area compared to Alternatives A-C. Infrastructure and activities under all alternatives would likely have little impact on obstruction of ptarmigan movements.

Mortality

The potential for ptarmigan mortality related to collisions with vehicular traffic in the Plan Area under Alternative D would be reduced compared to Alternatives A-C because of the elimination of most roads. Collisions of ptarmigan with vehicles or machinery could occur on production pads or access roads to airstrips. Ptarmigan mortality could also occur from collisions with buildings, facilities, and pipelines. Ptarmigan are not likely to collide with aircraft and would not be affected by the increase in airstrips.

Operation Period

During the operation period under Alternative D, the potential types of impacts to ptarmigan from habitat loss and alteration, disturbance, obstructions to movements, and mortality would be the same as those described above for project construction.

Raptors and Owls

Raptors are generally uncommon visitors and occasional nesters in the Plan Area. Habitat loss and disturbance resulting from the proposed development in Alternative D are unlikely to affect raptors because of the low numbers of raptors reported in the Plan Area. Gravel roads, buildings, pipelines, and bridges would not obstruct raptor movements. Perches provided by communication towers, buildings, and pipelines at 7 feet may increase the ability of raptors to prey on other waterfowl, shorebirds, passerines, and ptarmigan. The small numbers of raptors and owls that occur in the Plan Area are unlikely to suffer any mortality from collisions with vehicular traffic, buildings, bridges, or pipelines.

Seabirds

Impacts to seabirds under Alternative D would be the same as those considered under Alternative A for the CD-3 site. A glaucous gull and a parasitic jaeger nest were within 500 meters of the proposed CD-4 airstrip and access road (Burgess et al. 2003a). No seabirds were reported nesting or brood-rearing near the CD-6 site. At CD-7, no seabird nests or broods were reported in the area of the proposed access road or airstrip. Several Sabine's gull and arctic tern nests were reported within 500 meters of the proposed airstrip (Burgess et al. 2003b).

Construction Period

Habitat Loss, Alteration, or Enhancement

Under Alternative D, most roads would be eliminated and the amount of tundra covered by gravel and lost as seabird habitat would be reduced compared to Alternatives A-C. Airstrips at each of the proposed sites would increase potential habitat loss in the immediate area of each site other than CD-3, which would remain the same as under Alternative A. Reduction in gravel placement by elimination of the connecting roads would cause a decrease of zero to two seabird nests in Alternative D compared to Alternatives A-C. Gravel fill would affect fewer acres of Deep Open Water with Islands or Polygonized Margins, and similar amounts of Aquatic Sedge with Deep Polygon habitats, used by nesting and brood-rearing seabirds in Alternative D compared to Alternatives A-C (Table 4D.3.3-2). Elevation of the pipeline from 5 feet to 7 feet could provide perching habitat that would enhance foraging efficiency for seabirds.

Disturbance and Displacement

Disturbance from vehicle traffic would be nearly eliminated in Alternative D compared to Alternatives A-C because of the elimination of roads connecting pads. Disturbance from air traffic would be increased in Alternative D by the addition of airstrips at all pads, while the potential for disturbance from aircraft would be increased by two to five seabird nests for Alternative D-1 and zero to three nests for Alternative D-2.

Obstructions to Movement

Obstructions to movements of seabird broods would be decreased in Alternative D compared to Alternatives A-C by the elimination of road connections between pads.

Mortality

Mortality resulting from collisions with vehicles would be nearly eliminated in Alternative D compared to Alternatives A-C by the elimination of roads connecting pads. Mortality from collisions with aircraft would be increased in Alternative D compared to Alternatives A-C with the addition of airstrips at each pad. Mortality from collisions with power lines would be eliminated by placement of all power lines on VSMs. Mortality from increased depredation on eggs or young could be increased by increasing the pipeline height from 5 feet to 7 feet, giving raptors, ravens, and seabirds a better vantage point.

Operation Period

Habitat Loss, Alteration, or Enhancement

Habitat loss and alteration resulting from gravel placement would continue during project operations and would be decreased in Alternative D compared to Alternatives A-C because of the general decrease in gravel fill associated with this alternative.

Disturbance and Displacement

Under Alternative D, disturbance to seabirds from vehicular traffic would be nearly eliminated by the lack of a road system. Disturbance from air traffic would be increased in Alternative D by the addition of airstrips at all pads, while the potential for disturbance from aircraft would be increased by two to five seabird nests for Alternative D-1 and zero to three nests for Alternative D-2.

Obstructions to Movement

Under Alternative D, any potential obstructions to movements of seabird broods related to the presence of gravel roads would be nearly eliminated compared to Alternatives A-C because of the elimination of roads connecting pads.

Mortality

Under Alternative D, the potential for seabird mortality from collisions with vehicular traffic or bridges would be nearly eliminated compared to Alternatives A-C because of the elimination of roads. Mortality resulting from collisions with aircraft would be increased by the addition of airstrips at all pads. Mortality from collisions with power lines would be eliminated with placement of power lines on VSMs in Alternative D.

Shorebirds

Construction Period

Habitat Loss, Alteration, or Enhancement

Under Alternative D, habitat loss associated with gravel roads would be greatly reduced compared to Alternatives A-C because of the elimination of roads connecting pads. Total habitat loss and alteration would be reduced in Alternative D compared to Alternatives A-C because of the smaller area of gravel fill (Table 4D.3.3-2), resulting in an increase of 12 to 80 shorebird nests for Alternative D-1 and an increase of 40 to 108 shorebird nests for Alternative D-2. Areas of habitats used by shorebirds that would be affected by decreased gravel fill in Alternative D compared to Alternatives A-C are Moist Sedge-Shrub Meadow, Moist Tussock Tundra, and Barrens (Table 4D.3.3-2). Fewer potential shorebird nests would be lost in Alternative D-2 than in Alternative D-1 because of the reduced gravel fill for helipads compared to airstrips. In all cases, less than 1 percent of these habitats available in the Colville River Delta and in the NPR-A portion of the Plan Area would be affected by gravel fill and dust deposition (Table 4D.3.3-2). Temporary habitat alteration from ice-road construction would be increased in Alternative D compared to Alternatives A-C, resulting in an increase of 14 to 21 shorebird nests potentially displaced by delayed melting for both Alternatives D-1 and D-2. Potential habitat alteration from thermokarsting and ponding also would be decreased in Alternative D compared to Alternatives A-C because of the elimination of roads connecting pads.

Temporary habitat loss and permanent habitat alteration from the removal of gravel from the ASRC Mine Site and Clover Potential Gravel Source would be reduced in Alternative D compared to Alternatives A-C because of the decreased amount of gravel required.

Disturbance and Displacement

Impacts to shorebirds from human activities during summer construction activities at production pads would be limited to the area around production pads. Noise-related impacts associated with aircraft would increase because of the presence airstrips at all pads; however, no displacement was shown, as indicated by decreased nesting density for shorebird nesting in the vicinity of the Alpine Development airstrip (Johnson et al. 2003a).

Obstructions to Movements

Potential obstructions to movements of shorebird broods would be nearly eliminated in Alternative D by elimination of roads connecting pads.

Mortality

Potential mortality resulting from collisions with vehicles would be nearly eliminated in Alternative D by the elimination of roads connecting pads. The potential for mortality from collisions with aircraft would be increased in Alternative D with the addition of airstrips at each pad location. Potential mortality from collisions with power lines would be eliminated with the placement of power lines on VSMs instead of poles in Alternative D. Potential mortality from depredation of adults, nests, and chicks by raptors, owls, or ravens could be increased by providing an increased vantage for predators with the 7-foot pipeline elevation compared to the 5-foot pipeline elevation.

Operation Period

Habitat Loss, Alteration, or Enhancement

Impacts to shorebirds from habitat loss and alteration would continue during project operations and would be decreased in Alternative D compared to Alternatives A-C because of the decreased gravel fill. Temporary

impacts from ice roads and tundra travel would be increased in Alternative D compared to Alternatives A-C because of the roadless nature of the alternative.

Disturbance and Displacement

Disturbance from vehicle traffic would be decreased in Alternative D compared to Alternatives A-C because of the elimination of road access to the pads. Disturbance and displacement from airplane noise could be increased in Alternative D by the addition of airstrips at each pad. Shorebirds were not shown to be displaced by the Alpine Development airstrip, however (Johnson et al. 2003a).

Obstructions to Movements

Obstruction to movements of shorebird broods would continue during project operation and would be decreased in Alternative D compared to Alternatives A-C by the elimination of road connections between pads

Mortality

Mortality resulting from collisions with vehicles would be nearly eliminated in Alternative D because of the elimination of road access to pads. Shorebirds are not likely to collide with aircraft. Mortality resulting from collisions with power lines would be eliminated by the placement of power lines on VSMs.

Passerines

Construction Period

Habitat Loss, Alteration, or Enhancement

Habitat loss or alteration would be reduced in Alternative D compared to Alternatives A-C by a reduction in gravel fill resulting in the gain of 3 to 41 passerine nests in Alternative D-1 and 16 to 54 passerine nests in Alternative D-2. Fewer areas of Riverine or Upland Shrub and Moist Sedge-Shrub Meadow habitats used by nesting passerines would be covered by gravel in Alternative D compared to Alternatives A-C. Temporary habitat alteration from ice-road construction would be increased in Alternative D compared to Alternatives A-C because of the lack of road access to all facilities. Habitat alteration resulting from thermokarsting and ponding would be reduced in Alternative D compared to Alternatives A-C because of the decreased gravel fill. Temporary habitat loss and permanent habitat alteration from the removal of gravel from the ASRC Mine Site and Clover Potential Gravel Source would be decreased in Alternative D compared to Alternatives A-C because of the reduced gravel requirements. Communication towers, pipelines, and buildings could provide perches for common ravens and possibly structures for nesting. VSMs and buildings would provide nesting structures for snow buntings.

Disturbance and Displacement

Disturbance from vehicle traffic would be nearly eliminated in Alternative D with the elimination of roads connecting pads. Noise-related impacts associated with aircraft would be increased with the addition of airstrips at all pads; however, no effect on nesting density was found for passerines at the Alpine Development airstrip (Johnson et al. 2003a).

Obstructions to Movements

As with Alternatives A-C, proposed development structures are not anticipated to obstruct passerine movements.

Mortality

Mortality resulting from collisions with vehicles would be nearly eliminated in Alternative D compared to Alternatives A-C by the elimination of roads connecting pads. Mortality from collisions with power lines would be eliminated in Alternative D with the placement of power lines on VSMs. Mortality from depredation of adults, nests, and young could be increased by providing a better vantage for predators with a 7-foot elevated pipeline compared to a 5-foot elevated pipeline.

Operation Period

Habitat Loss, Alteration, or Enhancement

Habitat loss and alteration would continue during project operation and would be reduced in Alternative D compared to Alternatives A-C because of the reduced gravel fill.

Disturbance and Displacement

Disturbance from vehicle traffic would be nearly eliminated in Alternative D compared to Alternatives A-C because of the elimination of roads connecting pads. Disturbance from aircraft would be increased but would be expected to have little or no effect on passerines.

Obstructions to Movements

Operational activities are not anticipated to obstruct movements of passerines.

Mortality

Mortality resulting from collisions with vehicles would be nearly eliminated in Alternative D. Mortality from collisions with power lines would also be nearly eliminated with placement of power lines on VSMs. Mortality from depredation of adults, nests, and chicks by raptors, owls, and common ravens perching on pipelines could be increased with the increased vantage point provided by a 7-foot versus a 5-foot pipeline elevation.

4D.3.3.2 Alternative D – Full-Field Development Plan Impacts on Birds

Under Alternative D FFD, roads to production pads would be eliminated and an airstrip (Alternative D-1) or a helipad (Alternative D-2) would be constructed at each production pad site. The mechanisms associated with habitat loss and alteration, disturbance and displacement, obstruction to movements, and mortality for birds in the Colville River Delta, Fish-Judy Creeks, and Kalikpik-Kogru Rivers Facility Groups would be the same as those described under Alternatives A-C. Potential impacts are summarized for Alternative D FFD based on nesting densities in the Colville River Delta and the NPR-A in Table 4D.3.3-4 and Table 4D.3.3-5. Total gravel placement would be reduced in Alternative D compared to Alternatives A-C, resulting in reduced potential for displacement of bird nests from gravel fill and dust fallout.

Colville River Delta Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Colville River Delta based on nesting densities reported for the Delta are presented in Table 4D.3.3-4 for Alternative D-1 and Table 4D.3.3-5 for Alternative D-2.

TABLE 4D.3.3-4 SUMMARY OF ALTERNATIVE D-1 FFD IMPACTS TO NESTING BIRDS

Bird Group	Gravel	Dust	Ice Roads	Airstrips[a]	Total
Colville River Delta					
Waterfowl	5	0	2	37	44
Loons	1	0	0	6	7
Ptarmigan	1	0	0	5	6
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	0	5	6
Shorebirds[b]	82	0	32	0	114
Passerines[b]	40	0	16	0	56
Total Birds	**130**	**0**	**50**	**53**	**233**
Fish-Judy Creeks					
Waterfowl	10	0	2	93	105
Loons	1	0	0	12	13
Ptarmigan	1	0	0	8	9
Raptors and Owls	0	0	0	0	0
Seabirds	2	0	0	14	16
Shorebirds[b]	72	0	16	0	88
Passerines[b]	38	0	9	0	47
Total Birds	**124**	**0**	**27**	**127**	**278**
Kalikpik-Kogru Rivers					
Waterfowl	5	0	5	39	49
Loons	1	0	1	5	7
Ptarmigan	1	0	1	4	6
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	1	6	8
Shorebirds[b]	35	0	36	0	71
Passerines[b]	18	0	19	0	37
Total Birds	**61**	**0**	**63**	**54**	**178**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip (Johnson et al. 2003b).

[b] No disturbance effects from airstrips have been shown for these groups (Johnson et al. 2003b).

TABLE 4D.3.3-5 SUMMARY OF ALTERNATIVE D-2 FFD IMPACTS TO NESTING BIRDS

Bird Group	Gravel	Dust	Ice Roads	Airstrips[a]	Total
Colville River Delta					
Waterfowl	4	0	2	21	27
Loons	1	0	0	3	4
Ptarmigan	1	0	0	3	4
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	0	3	4
Shorebirds[b]	57	0	32	0	89
Passerines[b]	28	0	16	0	44
Total Birds	**92**	**0**	**50**	**30**	**172**
Fish-Judy Creeks					
Waterfowl	9	0	2	54	65
Loons	1	0	0	7	8
Ptarmigan	1	0	0	5	6
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	0	8	9
Shorebirds[b]	62	0	16	0	78
Passerines[b]	32	0	9	0	41
Total Birds	**106**	**0**	**27**	**74**	**207**
Kalikpik-Kogru Rivers					
Waterfowl	5	0	5	22	32
Loons	1	0	1	3	5
Ptarmigan	1	0	1	2	4
Raptors and Owls	0	0	0	0	0
Seabirds	1	0	1	3	5
Shorebirds[b]	36	0	36	0	72
Passerines[b]	19	0	19	0	38
Total Birds	**63**	**0**	**63**	**30**	**156**

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 m of airstrip (Johnson et al. 2003b).

[b] No disturbance effects from airstrips have been shown for these groups (Johnson et al. 2003b).

Habitat Loss, Alteration, or Enhancement

Under Alternative D FFD, the amount of habitat loss associated with the project compared to Alternatives A-C would be reduced by elimination of the access roads to CD-4 and CD-12 and the road to the Nigliq Channel. However, habitat loss would be increased by construction of airstrips at CD-11, CD-12, and CD-15. Reduction in gravel fill would reduce the numbers of nesting birds displaced by 21 to 135 nests for Alternative D-1 and 67 to 181 for Alternative D-2 throughout the Plan Area. The requirement for ice roads would increase because of the lack of gravel access roads to pads, resulting in an increase in displacement for 22 to 42 potential nests throughout the Plan Area.

Disturbance and Displacement

Under Alternative D FFD in the Colville River Delta Facility Group, the potential for disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A-C because of the elimination of access roads and the road to Nuiqsut. The potential for disturbance related to aircraft would be increased by the construction of airstrips at all pad locations, which would lead to the displacement of 53 (D-1) or 30 (D-2) potential nests (Tables 4D.3.3-4 and 4D.3.3-5).

Obstruction to Movement

Under Alternative D FFD in the Colville River Delta Facility Group, any potential obstruction to movement related to roads would be nearly eliminated compared to Alternatives A-C.

Mortality

Mortality resulting from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A-C FFD by to the elimination of access roads to pads and placement of power lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at each pad location.

Fish-Judy Creeks Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Fish-Judy Creeks Facility Group based on nesting densities reported for the NPR-A portion of the Plan Area are presented in Table 4D.3.3-4 for Alternative D-1 and Table 4D.3.3-5 for Alternative D-2.

Habitat Loss, Alteration, or Enhancement

Under Alternative D FFD, the amount of habitat loss associated with the project compared to Alternatives A-C would be reduced by elimination of the access roads to CD-4 and CD-12 and the road to the Nigliq Channel, but would be increased by construction of airstrips at CD-11, CD-12, and CD-15. Gravel fill would displace a potential of 124 nests for Alternative D-1 and 106 nests for Alternative D-2 in the Fish-Judy Creeks Facility Group (Tables 4D.3.3-4 and 4D.3.3-5). The requirement for ice roads would increase because of the lack of gravel access roads to pads, resulting in an increase in displacement of 27 potential nests in the Fish-Judy Creeks area (Table 4D.3.3-4).

Disturbance and Displacement

Under Alternative D FFD in the Fish-Judy Creeks Facility Group, the potential for disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A-C because of the elimination of access roads. The potential for disturbance related to aircraft would be increased by the construction of airstrips at all pad locations, which would lead to the displacement of 127 (D-1) or 74 (D-2) potential nests (Tables 4D.3.3-4 and 4D.3.3-5).

Obstruction to Movement

Under Alternative D FFD in the Fish-Judy Creeks Facility Group, any potential obstruction to movement related to roads would be nearly eliminated compared to Alternatives A-C.

Mortality

Mortality resulting from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A-C FFD by the elimination of access roads to pads and placement of power

lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at each pad location.

Kalikpik-Kogru Rivers Facility Group

A summary of the potential numbers of bird nests affected by the hypothetical FFD in the Kalikpik-Kogru Rivers Facility Group based on nesting densities reported for the NPR-A portion of the Plan Area are presented in Table 4D.3.3-4 for Alternative D-1 and Table 4D.3.3-5 for Alternative D-2.

Habitat Loss, Alteration, or Enhancement

Under Alternative D FFD, the amount of habitat loss associated with the project compared to Alternatives A-C would be reduced by elimination of the access roads to CD-4 and CD-12 and the road to the Nigliq Channel, but would be increased by construction of airstrips at CD-11, CD-12, and CD-15. Gravel fill would displace a potential of 61 nests for Alternative D-1 and 63 nests for Alternative D-2 in the Kalikpik-Kogru Rivers Facility Group (Tables 4D.3.3-4 and 4D.3.3-5). The requirement for ice roads would increase because of the lack of gravel access roads to pads, resulting in an increase in displacement of 63 potential nests in the Kalikpik-Kogru rivers area (Table 4D.3.3-4).

Disturbance and Displacement

Under Alternative D FFD in the Kalikpik-Kogru Rivers Facility Group, the potential for disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A-C because of the elimination of access roads. The potential for disturbance related to aircraft would be increased by the construction of airstrips at all pad locations, which would lead to the displacement of 54 (D-1) or 30 (D-2) potential nests (Tables 4D.3.3-4 and 4D.3.3-5).

Obstruction to Movement

Under Alternative D FFD in the Kalikpik-Kogru Rivers Facility Group, any potential obstruction to movement related to roads would be nearly eliminated compared to Alternatives A-C.

Mortality

Mortality resulting from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A-C FFD by the elimination of access roads to pads and placement of power lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at each pad location.

4D.3.3.3 Alternative D – Summary of Impacts (CPAI and FFD) on Birds

Potential impacts to birds associated with construction and operation of the proposed development include habitat loss, alteration, or enhancement; disturbance and displacement; obstructions to movement; and mortality. To determine the level of effect, we evaluated the nesting densities of bird species groups around the area of each proposed development and evaluated the number of nests potentially exposed to the action. In most cases, effects would involve a few individuals, would be localized, and no adverse effects to populations would be expected. Habitat loss does not involve the direct loss of active nests because winter gravel placement, ice-road construction, snow dumping, and snowdrifting occur when nests are not active. Most impacts would be initiated during the construction period, including gravel placement, grading of the gravel surface, placement of all facilities, and initial drilling. The results of these activities for Alternative D for both the CPAI Development Plan and FFD are presented in Table 4D.3.3-6.

4D.3.3.4 Alternative D – Potential Mitigation Measures (CPAI and FFD) for Birds

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.3).

TABLE 4D.3.3-6 CPAI DEVELOPMENT PLAN AND FFD ALTERNATIVE D – POTENTIAL BIRD NESTS DISPLACED BY HABITAT LOSS OR ALTERATION AND DISTURBANCE

Bird Group	Gravel	Dust	Ice	Airstrip [a]	Total
CPAI Development Plan Alternative D-1 Totals					
Waterfowl	6	0	7	36	49
Loons	1	0	1	5	6
Ptarmigan	1	0	1	4	5
Seabirds	1	0	1	5	7
Shorebirds	48	0	67	0	115
Passerines	23	0	34	0	57
Total Nests	79	0	111	49	239
CPAI Development Plan Alternative D-2 Totals					
Waterfowl	2	0	7	21	30
Loons	0	0	1	3	4
Ptarmigan	0	0	1	2	3
Seabirds	0	0	1	3	4
Shorebirds	20	0	67	0	87
Passerines	10	0	34	0	44
Total Nests	33	0	111	29	172
FFD Alternative D-1 Totals					
Waterfowl	20	0	9	169	198
Loons	3	0	1	23	27
Ptarmigan	3	0	1	17	21
Seabirds	4	0	1	25	30
Shorebirds	189	0	84	0	273
Passerines	96	0	44	0	140
Total Nests	315	0	140	234	689
FFD Alternative D-2 Totals					
Waterfowl	18	0	9	97	124
Loons	3	0	1	13	17
Ptarmigan	3	0	1	10	14
Seabirds	3	0	1	14	18
Shorebirds	155	0	84	0	239
Passerines	79	0	44	0	123
Total Nests	261	0	140	134	535

Notes:

[a] Disturbance at airstrips would potentially reduce nesting by 50% within 500 meters of airstrip for waterfowl, loons, and seabirds. No disturbance was evident for shorebirds and passerines (Johnson et al. 2003b)

4D.3.4 Mammals

4D.3.4.1 Terrestrial Mammals

Alternative D – CPAI Development Plan Impacts on Terrestrial Mammals

The primary characteristic of Alternative D (Figure 2.4.4-1) with regard to potential impacts on terrestrial mammals is the lack of roads (except a 3.6-mile road from an airstrip to CD-4 in Alternative D-1). Alternative D has the same pipeline routing and length (32.2 miles) as Alternative A. However, pipelines in Alternative D would be elevated to at least 7 feet. Alternative D would include new airstrips or helipads at CD-3 through CD-7. There would be more gravel fill at the production pads/airstrips (172.9 acres) compared to Alternative A (76.2 acres). There would be 97 fewer total acres of gravel fill under Alternative D-1 (173 acres) than under Alternative A (270 acres). Alternative D-2 would have helipads instead of airstrips and would have a total of only 67 acres of gravel fill.

Construction Period

Direct Habitat Loss, Alteration, or Enhancement

Under Alternative D no permanent roads would connect drilling pads or processing facilities, and airstrips would be constructed adjacent to five of the production sites. There would be 97.4 fewer acres of gravel placed in Alternative D-1 (and 203.1 fewer acres in Alternative D-2), than in Alternative A. Loss of habitat during construction of pipelines from ice roads would be similar to Alternative A. See the Operation Period section under Alternative D for quantification of habitat types lost or altered under gravel fill.

Disturbance and Displacement

Because there is almost no road construction under Alternative D, disturbance and displacement effects on terrestrial mammals during the winter construction phase would be reduced compared to Alternatives A, B, and C. There would be pipeline construction, but the lack of hauling and placing large quantities of gravel in roads would reduce the noise and vehicle traffic significantly. Construction at the production sites and airstrips would include gravel fill, so potential disturbance at these sites would parallel that described in Alternative A.

Obstruction to Movements

During the construction phase, there would be some traffic on ice roads during construction of pads, pipelines, and airstrips. The duration and extent of traffic would be considerably less than in the other alternatives with road construction. This would result in less obstruction of movements of caribou that winter in the Plan Area than under the other alternatives.

Mortality

Vehicle collisions with terrestrial mammals would be fewer under Alternative D than the other alternatives because of the reduced extent of road construction. Mortality to small mammals is expected to be reduced by the elimination of gravel placement for roads.

Operation Period

Direct Habitat Loss, Alteration, or Enhancement

Direct habitat loss under Alternative D would be substantially less than the other alternatives because of the lack of gravel roads. However, 172 acres of gravel fill would be placed for Alternative D-1 (and 67 acres for Alternative D-2), some of which might provide some insect-relief habitat. Gravel fill at airstrips would probably not provide insect relief because, for aircraft safety, animals would not be allowed to stay on the airstrips. During winter throughout the life of the project, ice roads would be constructed for ground access to production pads throughout the Plan Area every few years, causing temporary loss of foraging habitat in winter.

The two most important foraging habitat types for caribou in summer are Moist Sedge-Shrub Meadow and Moist Tussock Tundra (Lawhead et al. 2003; Russell et al. 1993; Jorgenson et al. 2003). The Barrens habitat type primarily provides insect relief to caribou in summer (Jorgenson et al. 2003). The most important habitat types for muskoxen include the Riverine, Upland Shrub, and Moist Sedge-Shrub Meadow habitat types (PAI 2002; BLM and MMS 2003, and references therein). These habitat types, as well as Barrens, are the most important habitat types for grizzly bears (Shideler and Hechtel 2000; Jorgenson et al. 2003; PAI 2002, and references therein). The Riverine and Upland Shrub habitat types are also the most important habitat types for moose. These habitat types potentially lost from gravel fill (roads, pad and airstrips) under Alternative D are quantified below.

A total of 3,261 acres of Moist Sedge-Shrub Meadow is available in the Colville River Delta (PAI 2002). The total area of Moist Sedge-Shrub Meadow in the habitat-typed area of the NPR-A is 39,920 acres (Jorgenson et al. 2003). A total of 17.37 acres (0.6 acre in the Colville River Delta; 16.78 acres in the NPR-A) of Moist Sedge-Shrub Meadow would be lost as a result of gravel placement (roads, pads, and airstrips) under Alternative D (Table 4D.3.1-2). The potential loss of Moist Sedge-Shrub Meadow habitat type from gravel fill is less than 0.1 percent of that available on the Colville River Delta. The potential habitat loss in the NPR-A cannot be calculated because a habitat map is not available for the entire area. However, the potential loss under gravel fill in the habitat-typed area in the NPR-A is about 0.01 percent of the Moist Sedge-Shrub Meadow habitat type available in that area. In addition to gravel fill, 8.25 acres (0.69 acre in the Colville River Delta; 7.56 acres in the NPR-A) of Moist Sedge-Shrub Meadow would be altered by dust fallout (Table 4D.3.1-2).

The combined area of Riverine and Upland Shrub habitat types in the Colville River Delta is 6,814 acres (PAI 2002). The combined area of Riverine and Upland Shrub habitat types in the NPR-A is 5,390 acres (Jorgenson et al. 2003). A total of 2.56 acres of Riverine and Upland Shrub habitat would be lost as a result of gravel placement (roads, pads, and airstrips) under Alternative D in the Colville River Delta (Table 4D.3.1-2). No Riverine or Upland Shrub habitat would be lost or altered in the NPR-A under Alternative D (Table 4D.3.1-2). The potential loss of Riverine and Upland Shrub habitat type is less than 0.1 percent of that available on the Colville River Delta. In addition to gravel fill, 1.38 acres of Riverine and Upland Shrub habitat in the Colville River Delta would be altered by dust fallout (Table 4D.3.1-2).

A total of 627 acres of Moist Tussock Tundra habitat type is available in the Colville River Delta (PAI 2002). The total area of Moist Tussock Tundra in the habitat-typed area of the NPR-A is 47,102 acres (Jorgenson et al. 2003). No Moist Tussock Tundra would be lost or altered in the Colville River Delta under Alternative D (Table 4D.3.1-2). A total of 37.11 acres of Moist Tussock Tundra would be lost as a result of gravel placement (roads, pads, and airstrips) in the NPR-A (Table 4D.3.1-2). The potential habitat loss in the NPR-A cannot be calculated because a habitat map is not available for the entire area. However, the potential loss under gravel fill in the habitat-typed area in the NPR-A is less than 0.1 percent of that available in that area. In addition to gravel fill, 16.81 acres of Moist Tussock Tundra habitat type would be altered by dust fallout in the NPR-A (Table 4D.3.1-2).

The total area of Barrens habitat type in the Colville River Delta is 19,440 acres (PAI 2002). The total area of Barrens in the habitat-typed area of the NPR-A is 1,698 acres (Jorgenson et al. 2003). A total of 0.07 acre of

Barrens habitat type would be lost as a result of gravel placement (roads, pads, and airstrips) in the Colville River Delta, and no Barrens would be lost or altered in the NPR-A under Alternative D (Table 4D.3.1-2). The potential loss of Barrens habitat is about 0.01 percent of that available in the Colville River Delta. In addition to gravel fill in the Colville River Delta, 0.08 acre of Barrens habitat type would be altered by dust fallout under Alternative D (Table 4D.3.1-2).

Disturbance and Displacement

Without roads, and therefore with no vehicle traffic, disturbance and displacement of terrestrial mammals would be primarily at production pads and adjacent airstrips under Alternative D. Air traffic would be a source of disturbance to caribou, moose, bears, and muskoxen (Miller and Gunn, 1984; TAPS Owners, 2001a). Five new airstrips in Alternative D-1 (and helipads in Alternative D-2) would result in more aircraft disturbance year-round than in the other alternatives. Traffic on ice roads between the production sites could disturb caribou or denning bears in the winter. This could also apply to muskoxen and moose, but these species are not common in the Plan Area in the winter. Summer use of low-ground-pressure vehicles throughout the Plan Area would cause some disturbance of terrestrial mammals. This traffic would be considerably less frequent than the vehicle traffic on gravel roads in the other alternatives. There could be less disturbance and displacement of terrestrial mammals under Alternative D because there would be no road access by local residents.

Obstruction to Movements

Alternative D would include construction of 3.6 miles of road to access an airstrip. There would be 32.2 miles of pipeline elevated to 7 feet, none of which would have an accompanying road (Figure 2.4.4-1). Because elevated pipelines without roads do not usually obstruct caribou movements, this would allow free passage of caribou and probably muskoxen and moose. There could still be some deflection or delay in crossing under pipelines, but it would be less than in the alternatives with road/pipeline combinations. The other alternatives have considerable amounts of road/pipeline combination (Alternative A, 25.8 miles; Alternative B, 10.0 miles; Alternative C, 41.0 miles) that could result in some obstruction of caribou movements.

Mortality

The potential for animal-vehicle collisions would be greatly reduced under Alternative D and would be limited to winter ice roads and the short roads from airstrips to production pads. Collisions on ice roads would be primarily with caribou, because grizzly bears are in dens and moose and muskoxen are uncommon in the Plan Area in winter. Mortality from increased hunter access on roads would be eliminated. Some disturbance of denning grizzly bears could occur near production pads and airstrips. Bear-human conflicts or exposure to harsh winter conditions following den abandonment could result in mortality of adults or cubs.

Alternative D – Full-Field Development Plan Impacts on Terrestrial Mammals

The primary characteristics of Alternative D with regard to effects on terrestrial mammals is the lack of roads connecting facilities and the airstrips at each facility. The pipeline routes are the same as those of Alternative A, but pipelines would be elevated to 7 feet. Access to the production sites would restricted to industry only because of the lack of roads.

The total amount of gravel fill under Alternative D-1 would be 816 acres versus 1,400 acres for Alternative A. Alternative D-2 would have 408 total acres of gravel fill. Because neither detailed site locations nor habitat mapping are available, we cannot quantify specific terrestrial mammal habitat lost under Alternative D FFD. However, Alternative D has the smallest acreage covered with gravel of the four alternatives and the smallest direct loss of vegetated habitat. A large proportion of the Alternative D-1 gravel would be airstrips and would probably not be used extensively by caribou for insect relief because they would be chased off for aircraft safety.

Colville River Delta Facility Group

Direct Habitat Loss, Alteration, or Enhancement

The differences between Alternative D and the other alternatives would be primarily the reduced amount of gravel fill under the roadless Alternative D. As with Alternative A, there would be seven new production sites with associated airstrips in this group. Alternative D would not differ appreciably from Alternatives A and B, which have limited new roads in this group of sites. Alternative D would have much less new road than would Alternative C.

Disturbance and Displacement

The lack of roads with traffic and lack of access by local residents, would minimize disturbance under Alternative D compared to Alternative C, which would have new roads to all sites in this facility group. There would be disturbance associated with increased aircraft and low-ground-pressure vehicle traffic and activity on pads, but the level across the sites in the Colville River Delta would be low compared with other areas and alternatives with more extensive roads. This would include less disturbance of denning grizzly bears, caribou during the summer insect season, and muskoxen and moose in the riparian areas.

Obstruction to Movements

The roadless nature of Alternative D, combined with pipelines elevated 7 feet , would minimize obstructions to movement of terrestrial mammals in the Colville River Delta Facility Group. There could be some deflection along the pipelines or around facilities and airstrips, but it would be predictably less than in the alternatives with roads between the facilities.

Mortality

The lack of roads under Alternative D would result in a minimum level of vehicle-animal collisions. Other mortality from hunting and human-animal interactions would also be minimized because of limited access to the Plan Area.

Fish-Judy Creeks Facility Group

Direct Habitat Loss, Alteration, or Enhancement

Alternative D has no new roads in this group of sites, while Alternatives A and C have extensive roads and Alternative B has an intermediate amount of roads. This would result in the minimum amount of habitat lost in Alternative D compared with the other alternatives.

Disturbance and Displacement

The lack of roads with traffic and lack of access by the public and local residents would minimize disturbance under Alternative D. There would be disturbance associated with increased air traffic and activity on pads, but the level across the Plan Area would be substantially reduced without roads. This would include less disturbance of calving caribou that may extend eastward into the Fish-Judy Creeks Facility Group and caribou on summer and winter ranges in this area. Grizzly bears in dens would experience less disturbance with the lack of road traffic, as would moose and muskoxen in the riparian areas. There would still be some level of disturbance associated with the production sites and airstrips in the Fish-Judy Creeks Facility Group.

Obstruction to Movements

The roadless nature of Alternative D, combined with pipelines elevated 7 feet, would minimize obstructions to movement of terrestrial mammals. There could be some deflection along the pipelines or around facilities and airstrips, but it would be predictably less than in Alternatives A-C, which would have roads between the facilities.

Mortality

The lack of roads under Alternative D would result in a minimum level of vehicle-animal collisions. Other mortality from hunting and human-animal interactions would also be minimized because of limited access to the Plan Area.

Kalikpik-Kogru Rivers Facility Group

Direct Habitat Loss, Alteration, or Enhancement

Alternative D has no new roads in this group of sites, while Alternatives A and C have extensive roads and Alternative B has an intermediate amount of roads. This would result in the minimum amount of habitat lost in Alternative D compared to the other alternatives.

Disturbance and Displacement

The lack of roads with traffic and lack of access by the public and local residents would minimize disturbance under Alternative D. There would be disturbance associated with increased air traffic and activity on facility pads, but the level across the area would be substantially reduced without roads. This would include less disturbance of calving caribou in the northwest part of the Plan Area and of caribou on summer and winter ranges in this area. Grizzly bears in dens would experience less disturbance from the lack of road traffic, as would moose and muskoxen in the riparian areas. There would still be some level of disturbance associated with the production sites and airstrips in the Kalikpik-Kogru Rivers Facility Group.

Obstructions to Movement

The roadless nature of Alternative D, combined with pipelines elevated 7 feet, would minimize obstructions to movement of terrestrial mammals. There could be some deflection along the pipelines or around facilities and airstrips, but it would be predictably less than in the alternatives with roads between the facilities.

Mortality

The lack of roads under Alternative D would result in a minimum level of vehicle-animal collisions. Other mortality from hunting and human-animal interactions would also be minimized because of limited access to the area.

Alternative D – Summary of Impacts (CPAI and FFD) on Terrestrial Mammals

CPAI Development Plan Alternative D-1 would cover 172.9 acres of undeveloped land with gravel fill. This is a small percentage of the land in the Plan Area, and is 97.4 acres less than Alternative A (203.1 acres less for Alternative D-2). The amount of habitat types preferred by caribou, muskoxen, and moose that would be affected by this fill is a small proportion of that available in the Plan Area. Alternative D would result in the smallest loss of habitats of the four alternatives. This is a small direct loss of terrestrial mammal habitat, compared to that available in the Plan Area.

Disturbance, obstruction of movements, and mortality impacts of Alternative D would be similar to those described for Alternative A. However, these impacts would be of considerably less magnitude in Alternative D

than in Alternative A because of the lack of road/pipeline combinations and associated vehicle traffic and the elevation of pipelines to 7 feet. Alternative D would have airstrips at each development site, so disturbance and obstruction of movements would occur there. Access in Alternative D would be restricted to industry, so the disturbance and hunting mortality from access by local residents would not occur. The potential positive and negative aspects of hunting mortality described for Alternative A would not occur.

Impacts from Alternative D FFD would be the same as those described for the CPAI Development Plan over a larger area. An exception is the potential for increased disturbance of calving caribou of the TLH in the northwestern part of the Plan Area.

Alternative D – Potential Mitigation Measures (CPAI and FFD) for Terrestrial Mammals

Potential mitigation measures for Alternative D would be generally the same as those described for Alternative A. The lack of roads alongside the pipelines between any of the production sites and elevation of pipelines to 7 feet might make buried pipeline sections unnecessary.

4D.3.4.2 Marine Mammals

Alternative D – CPAI Development Plan Impacts on Marine Mammals

Characteristics of Alternative D that could affect marine mammals include the burying of the pipeline across the Nigliq Channel, the lack of roads, and increased air traffic.

Ringed Seal and Bearded Seal

The impacts to ringed seals expected under Alternative D would differ from those expected under Alternative A. There could be more disturbances from increased air traffic over the Beaufort Sea. Aircraft traffic is a potential source of disturbance to ringed seals hauled out on the ice in spring. However, aircraft are expected to maintain an elevation greater than 1,000 feet except on takeoff and landing. At that elevation, the potential for disturbance to ringed seals is greatly reduced, and impacts to ringed seals would not be expected to increase compared to Alternative A.

There would not be the potential for enhanced hunter access to ringed seal habitat, as there is in the other alternatives, because of the lack of roads in Alternative D.

Spotted Seals

Routing the pipeline underneath the Nigliq Channel using HDD instead of the pipeline/vehicle bridge in the other alternatives would eliminate disturbance to spotted seals in the channel. However, elimination of roads requires increased aircraft traffic to access all pads. Aircraft landing and takeoff plans call for aircraft to remain at 1,000 feet altitude until 3.5 miles from the airstrip on landing, and to climb to 1,000 feet within 1 mile of takeoff. Thus, aircraft would cross Nigliq Channel at a minimum of 1,000 feet altitude. At such elevation, the potential to disturb spotted seals is substantially reduced. Thus, no additional impacts to spotted seals are expected to result from the increased aircraft traffic under Alternative D.

There would not be enhanced access to spotted seal habitat for hunters under Alternative D, so this impact described in the other alternatives would not occur.

Polar Bears

The impacts to polar bears expected under Alternative D might differ from those expected under Alternative A. The elimination of roads would require additional aircraft flights to access all production pads and the construction of ice roads every few years during operations. The additional aircraft flights would increase the disturbance to non-denning polar bears during the winter. The construction of ice roads every few years could

increase disturbance to female polar bears denning within approximately 1 mile of the roads. Current regulations require a buffer of 1 mile around known and suspected polar bear dens, and those regulations appear to be sufficient to prevent disturbance to denning bears. The number of bears affected would depend on the number of bears denning in the Plan Area. During recent years, few polar bears have denned within the Plan Area, and there is no reason to believe that the number of bears that den there would increase. Thus, impacts to polar bears as a result of increased ice road construction are expected to be minimal.

The lack of roads in Alternative D would reduce potential bear-human conflict and would not enhance hunter access in the Plan Area.

Beluga Whales

Routing the pipeline underneath Nigliq Channel via HDD and elimination of the pipeline/vehicle bridge would eliminate disturbance to beluga whales in the channel that might have been caused by construction and use of the bridge. However, elimination of roads requires increased aircraft traffic to access all pads. Several flights per week would be necessary to transport personnel and equipment across the Nigliq Channel to CD-5, CD-6, and CD-7. Aircraft landing and takeoff plans call for aircraft to remain at 1,000 feet altitude until 3.5 miles from the airstrip on landing and to climb to 1,000 feet within 1 mile of takeoff. Thus, aircraft would cross Nigliq Channel at a minimum of 1,000 feet altitude. At such elevation, the potential to disturb beluga whales is substantially reduced. Thus, no additional impacts to beluga whales are expected to result from the increased aircraft traffic under Alternative D. Hunter access to the Plan Area would not be enhanced in Alternative D because of the lack of roads. This would result in no new impacts on belugas from hunting.

Alternative D – FFD Plan Impacts on Marine Mammals

Full-field development under Alternative D has no new roads to production sites. When compared to Alternative A, impacts from Alternative D FFD would be less during summer because of the elimination of vehicular traffic. Aircraft access to all production pads would be required, which could increase the disturbance of ringed seals hauled out on the ice, as well as disturbance of spotted seals and beluga whales in the Colville River Delta and the delta of Fish and Judy creeks. Additional aircraft traffic could increase the disturbance of non-denning polar bears.

The ice road construction required every few years would still have the potential to affect ringed seals if the ice road is constructed over water greater than 3 meters deep. If ice roads connecting pads other than CD-3 (construction of ice roads to CD-3 would be required under all alternatives other than Alternative C) were constructed along a coastal route, the potential to disturb ringed seals would be greater than if the ice roads were constructed over land. The impacts to ringed seals would be the same as under Alternative A, but the probability of occurrence would be greater, depending on how often ice roads were built.

Alternative D - Summary of Impacts (CPAI and FFD) on Marine Mammals

Alternative D would have minimal impacts on marine mammals because of the lack of roads and no local or public access. Noise from construction and increased air traffic may cause disturbance of marine mammals as described for Alternative A.

Impacts from Alternative D would be the same as those described for CPAI over a larger area.

Alternative D – Potential Mitigation Measures (CPAI and FFD) for Marine Mammals

Potential mitigation measures would be the same as those identified for Alternative A (Section 4A.3.4).

4D.3.5 Threatened and Endangered Species

4D.3.5.1 Bowhead Whale

Alternative D – CPAI Development Plan Impacts on Bowhead Whale

Bowhead whales are generally not found in the Plan Area, but increased air traffic in Alternative D, if it is over the Beaufort Sea, could disturb some whales. Other activities that would occur in the Plan Area under all alternatives would not affect the bowhead whale population, habitat, migration, foraging, breeding, survival and mortality, or critical habitat.

Alternative D – Full-Field Development Plan Impacts on Bowhead Whale

Marine sealifts through the Beaufort Sea could be required to transport drilling or processing facilities under FFD. In this case, there is potential for impacts on bowhead whales. Impacts to bowheads could result from noise, pollution, displacement from the migration corridor, and vessel strikes. However, the use of docks was determined not to be a practical means of developing the facilities proposed by CPAI or during future development (Section 2.6.4), so this impact could be unlikely.

Alternative D – Summary of Impacts (CPAI and FFD) on Bowhead Whale

The potential impacts from CPAI Development Plan Alternative D would be the same as those for Alternative A, except there would be increased air traffic to the CD-4, CD-5, CD-6, and CD-7 sites. This is also the case under Alternative D FFD, in which there would also be more airstrips than in Alternative A.

Alternative D – Recommended Mitigation Measures (CPAI and FFD) for Bowhead Whale

Mitigation measures to reduce impacts to bowhead whales could include aircraft altitude restrictions over the nearshore Beaufort Sea during periods when whales could be present (spring, summer, fall). Oil spill prevention and cleanup capabilities are also appropriate mitigation measures to reduce potential impacts to bowheads. In the event of sealifts to transport material to the FFD sites, measures to minimize disturbance of, or strikes to, migrating whales by vessels would be appropriate.

4D.3.5.2 Spectacled Eider

Alternative D – CPAI Development Plan Impacts on Spectacled Eider

Under Alternative D the potential for the project to affect spectacled eider habitat loss and alteration at CD-3 would be the same as under Alternative A. For CD-4, CD-5, CD-6, and CD-7 there would be a decrease in potential spectacled eider habitat loss because of the elimination of the road system and reduced gravel fill. No spectacled eider nests were reported in the vicinity of the proposed pads, access roads, or airstrips in the CD-6 and CD-7 areas, but spectacled eider nests were reported in the vicinity of the CD-4 and CD-5 sites (Burgess et al. 2003a, 2003b).

Construction Period

Habitat Loss and Alteration

Gravel placement for the construction of airstrips or helipads would reduce nesting habitat loss in Alternative D compared to Alternatives A-C. Less than one pre-nesting eider and one eider nest would be potentially displaced by gravel placement for airstrips or helipads in the Colville River Delta. No displacement of spectacled eiders would be expected in the NPR-A portion of the Plan Area because of the low occurrence of this

species in these areas. The types of impacts associated with gravel placement for spectacled eiders in Alternative D would be the same as those described under Alternative A.

In the Colville River Delta, Aquatic Sedge with Deep Polygons habitat used by pre-nesting, nesting, and brood-rearing spectacled eiders would have consistent impacts across Alternatives D, A, and B (Table 4A.3.5-1). Patterned Wet Meadow habitats in the Colville River Delta would be covered by more gravel fill in Alternative D than in Alternatives A and B, but fill would cover less of this habitat used by nesting and brood-rearing eiders than in Alternative C (Table 4A.3.5-1). In the NPR-A portion of the Plan Area, gravel cover would be reduced in Alternative D for Old Basin Wetland Complex habitat preferred by pre-nesting eiders and used by nesting spectacled eiders compared to Alternatives A-C (Table 4A.3.5-2). Gravel cover for Patterned Wet Meadow in the NPR-A portion of the Plan Area would be reduced in Alternative D compared to Alternatives A and C. In all instances, habitat impacts would affect less than 1 percent of habitats available in the Colville River Delta and in the NPR-A portion of the Plan Area that are used by spectacled eiders (Table 4A.3.5-1 and Table 4A.3.5-2).

Disturbance and Displacement

During the construction phase of the project, no spectacled eiders would be disturbed or displaced because most construction activities would be conducted during the winter when these groups are not present on the Arctic Coastal Plain. Although disturbances might displace some eiders from nesting, brood-rearing, or foraging habitat, disturbance would probably not occur during the construction period unless construction activities, such as final road grading and compaction, occur during the summer breeding season.

Disturbances from vehicle traffic would be nearly eliminated in Alternative D compared to Alternatives A-C by the elimination of the road connecting CD-3 to CD-1 in the Colville River Delta and the more extensive road system with a connection to Nuiqsut in the NPR-A. Disturbance from air traffic would be increased in Alternative D compared to Alternatives A-C by the addition of airstrips at all pad locations. These airstrips would potentially displace one pre-nesting spectacled eider and two spectacled eider nests in Alternative D-1 and less than one pre-nesting eider and one spectacled eider nest in Alternative D-2.

Obstructions to Movement

Potential obstruction of movement would be nearly eliminated in Alternative D compared to Alternatives A-C by the removal of connecting roads between all facilities. The general reduction in gravel fill and reduction in vehicle traffic would result in a reduction in potential obstruction of movements for brood-rearing spectacled eiders.

Mortality

The elimination of connecting roads between pads would nearly eliminate potential mortality from collisions with vehicles in Alternative D compared to Alternatives A-C. Mortality from collisions with aircraft would be increased in Alternative D compared to Alternatives A-C with the additions of airstrips or helipads at all pads. The potential for increased nest and duckling depredation from raptors and ravens would be reduced in Alternative D compared to Alternatives A-C by the placement of all power lines on VSMs. Increasing the pipeline elevation to 7 feet rather than 5 feet in Alternatives A-C could lead to increased predator efficiency from the higher vantage point.

Operational Period

Habitat Loss and Alteration

Most potential loss and alteration of spectacled eider habitat would occur during the construction period and would be related to gravel placement. Although some habitat loss and alteration may occur from dust deposi-

tion, thermokarst, and the creation of impoundments during the operation period of the project, these impacts are initiated during construction. Therefore the factors causing habitat loss and alteration are discussed above in the Construction Period section.

Some habitat loss or alteration from snowdrifts, gravel spray, dust fallout, thermokarst, and ponding would continue during project operation. Dust fallout would be expected to be less than during the construction because of reduced traffic. Habitat alterations from dust fallout would be reduced in Alternative D compared to Alternatives A-C by the near elimination of vehicle traffic because of the elimination of connecting roads. Habitat alterations caused by low-ground-pressure vehicles during summer or winter and annual ice roads during drilling would be increased in Alternative D compared to Alternatives A-C because of the lack of road access to all facilities.

Disturbance and Displacement

Under Alternative D, disturbance to spectacled eiders from vehicular traffic would be nearly eliminated by elimination of the road system. Some disturbance related to vehicular traffic and machinery could occur along access roads from the well pads to the airstrips at each site. The potential for disturbance would be greatest at the CD-3 site, where spectacled eiders are known to nest. The potential for disturbance related to air traffic at the CD-3 site under Alternative D would be the same as under Alternative A. At all other sites, the potential for aircraft-related disturbance would be increased compared to Alterative A because of the addition of airstrips at each of these sites. The potential for impacts to affect spectacled eiders would be greatest at the CD-4 and CD-5 sites, where eiders have been reported nesting (Burgess et al. 2003a, 2003b). Disturbance from air traffic would potentially displace one pre-nesting eider and two spectacled eider nests in Alternative D-1 and less than one pre-nesting eider and one eider nest in Alternative D-2.

Obstructions to Movement

Under Alternative D, any potential obstruction to spectacled eider brood movements in the CD-3 area would be the same as that discussed above for Alternative A. At the proposed NPR-A sites and CD-4, potential obstructions from road placement to spectacled eider brood movements would be eliminated by the elimination of connecting roads in this alternative.

Mortality

Under Alternative D, the potential for spectacled eider mortality related to collisions with vehicular traffic would be virtually eliminated because of the elimination of roads under this alternative. There would be a potential for collisions of eiders with vehicles along access roads between production pads and roads, but collisions would be unlikely. The potential for spectacled eider mortality from collisions with aircraft would be increased under Alternative D compared to Alternatives A-C. Mortality from collisions with power lines would be eliminated by placement of all power lines on VSMs. Mortality from collisions with buildings, towers, and elevated pipelines, particularly during periods of poor visibility, would be similar among alternatives.

Alternative D – Full-Field Development Plan Impacts on Spectacled Eider

The mechanisms associated with habitat loss and alteration, disturbance and displacement, obstruction to movements, and mortality for birds in the Colville River Delta, Fish-Judy Creeks, and Kalikpik-Kogru Rivers Facility Groups would be the same as those described under Alternative A. Table 4A.3.5-1 summarizes potential impacts for Alternative D FFD based on pre-nesting and nesting spectacled eider densities in the Colville River Delta and the NPR-A. Under Alternative D FFD, roads to production pads would be eliminated and an airstrip would be constructed at each pad site.

Colville River Delta Facility Group

Table 4A.3.5-1 presents a summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD, including the Colville River Delta, based on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area.

Habitat Loss, Alteration, or Enhancement

Total habitat loss resulting from gravel placement and dust fallout would be reduced in Alternative D FFD compared to Alternatives A-C FFD. Gravel fill would result in potential displacement of no pre-nesting eiders and one spectacled eider nest in Alternative D-1 and Alternative D-2 throughout the Plan Area (Table 4A.3.5-1). Total habitat alteration from ice road construction and tundra travel would be increased from Alternatives A-C FFD because of the lack of road access to all facilities. The 7-foot pipeline elevation could decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

Under Alternative D FFD in the Colville River Delta area, disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A-C FFD by the elimination of all pad access roads. The potential for disturbance related to aircraft would be increased compared to Alternatives A-C FFD because of the construction of airstrips at all production pads. The addition of airstrips and helipads at all pads would potentially displace two pre-nesting and six nesting spectacled eiders in Alternative D-1 and one pre-nesting and three nesting spectacled eiders in Alternative D-2 throughout the Plan Area (Table 4A.3.5-1). The greatest effects of disturbance to spectacled eiders likely would be in the CD-3 and CD-12, areas where spectacled eiders are more abundant (Figure 3.3.5.2-1).

Obstruction to Movement

The removal of access roads would reduce any potential obstruction of brood-rearing spectacled eiders in Alternative D FFD compared to Alternatives A-C FFD.

Mortality

Mortality from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A-C FFD by the elimination of access roads to pads and placement of all power lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at all pad locations.

Fish-Judy Creeks Facility Group

A summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD including the Fish-Judy creeks area based on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area is presented in Table 4A.3.5-1.

Habitat Loss, Alteration, or Enhancement

Total habitat loss resulting from gravel placement and dust fallout would be reduced in Alternative D FFD compared to Alternatives A-C FFD. Gravel fill would result in potential displacement of no pre-nesting eiders and one spectacled eider nest in Alternative D-1 and Alternative D-2 throughout the Plan Area (Table 4A.3.5-1). Habitat loss from the construction of airstrips could be most likely to affect spectacled eiders near the CD-8 and CD-22 sites, where eider densities appear to be higher (Figure 3.3.5.2-1). Total habitat alteration from ice road construction and tundra travel would be increased from Alternatives A-C FFD because of the

lack of road access to all facilities. The 7-foot pipeline elevation could decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

Under Alternative D FFD in the Fish-Judy Creeks Facility Group, disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A-C FFD by the elimination of all pad access roads. The potential for disturbance related to aircraft would be increased compared to Alternatives A-C FFD because of the construction of airstrips at all production pads. The addition of airstrips and helipads at all pads would potentially displace two pre-nesting and six nesting spectacled eiders in Alternative D-1 and one pre-nesting and three nesting spectacled eiders in Alternative D-2 throughout the Plan Area (Table 4A.3.5-1).

Obstruction to Movement

The removal of access roads would reduce any potential obstruction of brood-rearing spectacled eiders in Alternative D FFD compared to Alternatives A-C FFD.

Mortality

Mortality from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A-C FFD by the elimination of access roads to pads and placement of all power lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at all pad locations.

Kalikpik-Kogru Rivers Facility Group

A summary of the potential numbers of pre-nesting and nesting spectacled eiders affected by the hypothetical FFD including the Kalikpik-Kogru Rivers Facility Group based on nesting densities reported for the Colville River Delta and in the NPR-A portion of the Plan Area is presented in Table 4A.3.5-1.

Habitat Loss, Alteration, or Enhancement

Total habitat loss resulting from gravel placement and dust fallout would be reduced in Alternative D FFD compared to Alternatives A-C FFD. Gravel fill would result in potential displacement of no pre-nesting eiders and one spectacled eider nest in Alternative D-1 and Alternative D-2 throughout the Plan Area (Table 4A.3.5-1). Habitat loss from the construction of airstrips may be most likely to affect spectacled eiders near the CD-27 and APF-3 sites in the Kalikpik-Kogru Rivers Facility Group, where eider densities appear to be higher (Figure 3.3.5.2-1). Total habitat alteration from ice road construction and tundra travel would be increased from Alternatives A-C FFD because of the lack of road access to all facilities. The 7-foot pipeline elevation could decrease the amount of snowdrifting and the resulting habitat alteration.

Disturbance and Displacement

Under Alternative D for FFD in the Kalikpik-Kogru rivers area, disturbance from vehicular traffic would be nearly eliminated compared to Alternatives A through C FFD by the elimination of all pad access roads. The potential for disturbance related to aircraft would be increased compared to Alternatives A through C FFD because of the construction of airstrips at all production pads. The addition of airstrips and helipads at all pads would potentially displace two pre-nesting and six nesting spectacled eiders in Alternative D-1 and one pre-nesting and three nesting spectacled eiders in Alternative D-2 throughout the Plan Area (Table 4A.3.5-1). The greatest potential for disturbance to spectacled eiders in the Kalikpik-Kogru Rivers Facility Group could occur at the CD-27 and APF-3 sites, where eider densities appear to by higher (Figure 3.3.5.2-1).

Obstruction to Movement

The removal of access roads would reduce any potential obstruction of brood-rearing spectacled eiders in Alternative D FFD compared to Alternatives A through C FFD.

Mortality

Mortality from collisions with vehicles and power lines would be nearly eliminated in Alternative D FFD compared to Alternatives A through C FFD as a result of the elimination of access roads to pads and placement of all power lines on VSMs. Mortality from collisions with aircraft would be increased by the addition of airstrips at all pad locations.

Alternative D – Summary of Impacts (CPAI and FFD) on Spectacled Eider

Most impacts to spectacled eiders from CPAI Alternatives A-D would occur in the Colville River Delta area and would be limited to a few individuals. Spectacled eiders occur in greater numbers near proposed developments in the Colville River Delta than in the NPR-A portion of the Plan Area.

- CPAI Alternative D-1 would potentially displace one pre-nesting eider and two spectacled eider nests.
- CPAI Alternative D-2 would potentially displace one pre-nesting eider and two spectacled eider nests.

Impacts from FFD Alternative A through D for spectacled eiders are summarized in Table 4A.3.6.2-1.

Alternative D – Potential Mitigation Measures (CPAI and FFD) for Spectacled Eider

Potential mitigation measures would be similar for CPAI Development Plan Alternative A and Alternative A FFD. Mitigation measures protective of bird habitats are presented in Section 4A.3.1.

Disturbance and Displacement

- Personnel are generally not allowed to walk across tundra.

Obstructions to Movements

- Traffic speeds on roads may be reduced during brood-rearing and traffic speeds enforced.
- Traffic levels may be reduced by limiting field access to industry only.

Mortality

- Spectacled eiders may be hazed away from active airstrips to prevent collisions with aircraft.

4D.3.5.3 Steller's Eider

This section describes the potential impacts of the ASDP on threatened Steller's eiders. Impacts to other bird groups associated with the proposed development are described in Section 4D.3.4 and can be referred to for more detailed description of the mechanisms of specific impacts. In general, impacts to Steller's eider potentially are the same as those described for spectacled eider under all of the alternatives. However, the likelihood of impacts occurring to Steller's eider is very small, even under FFD scenarios, because Steller's eiders occur very rarely in the Plan Area. Still, there would be a loss of potential Steller's eider habitat from the ASDP. Given the current distribution of Steller's eider in the Plan Area, it is unlikely that any of the project alternatives would have impacts on this species.